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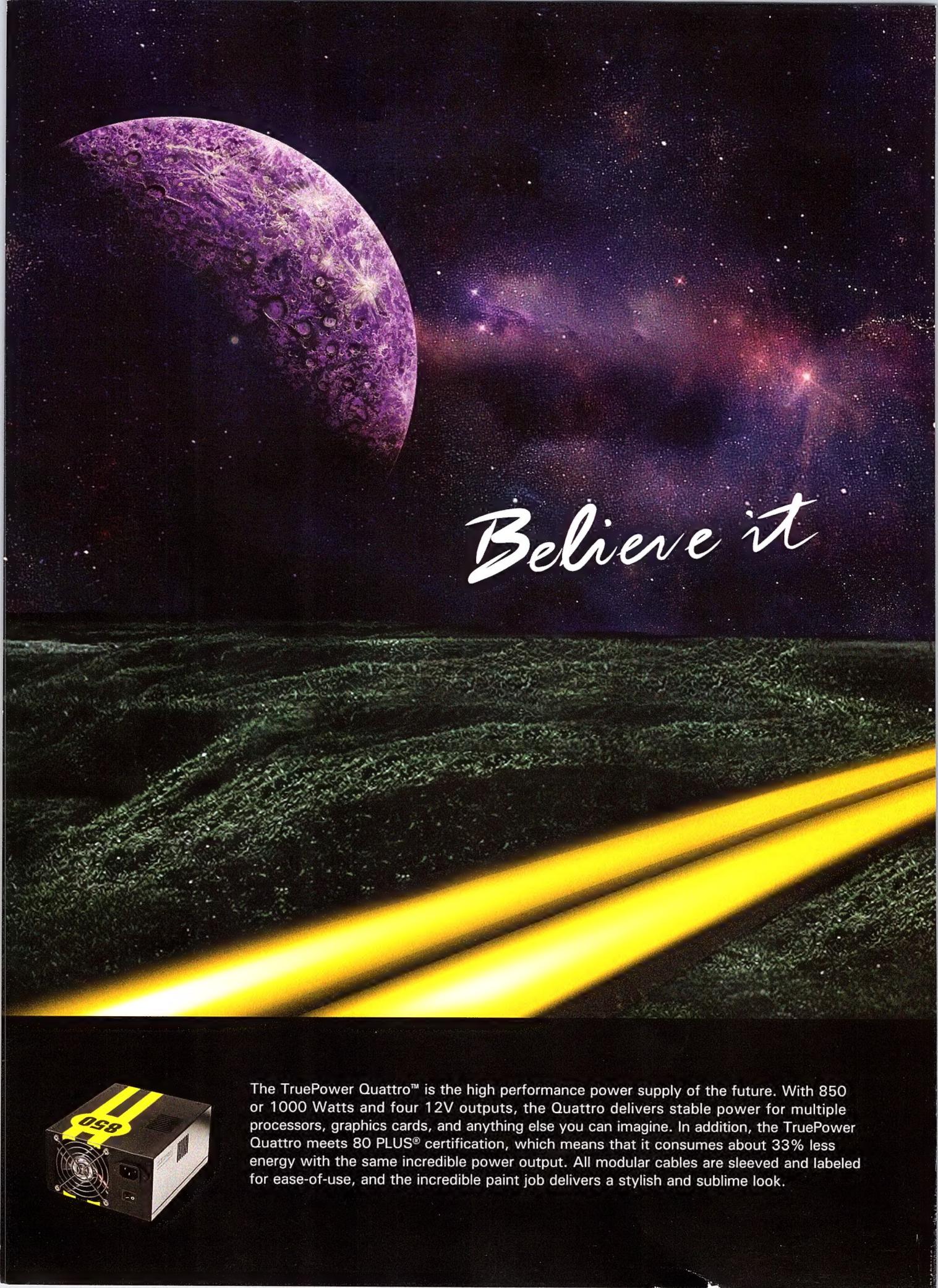
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**SINS OF A SOLAR EMPIRE:**  
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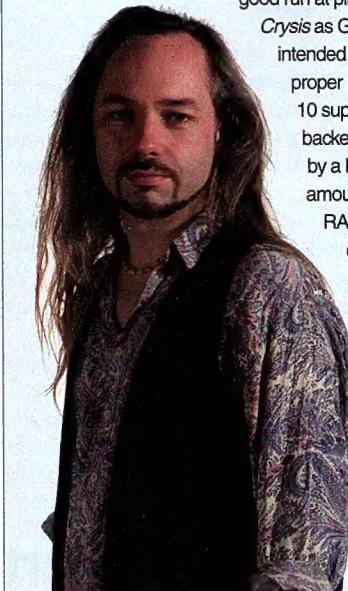
## EDHEAD

## KHAHAAN!!!!

You could be forgiven for thinking that we at Atomic HQ live in some wonderful world populated by bleeding edge technology and super powerful computers. Sometimes, it can be a little like that, and you'll step back and go "Wow, this ain't a bad gig after all". But of course, it doesn't take much to bring you crushing back down to earth, and I want to share a little cautionary tale of computing woe with you this month to illustrate that even for so-called 'pros', upgrading can be a real trial.

I've slowly been getting together the makings of a pretty beefy system. 4GB of speedy RAM, an 8800GTX, a Josh-approved and tested DualCore CPU, a well ventilated case and lovely large LCD display. You know, just to play Tetris on.

Actually, one of the big drivers behind the new system was putting together a machine that could make a good run at playing *Crysis* as God intended – with proper DirectX 10 support backed up by a helluva amount of RAM. This entailed



making the long-delayed jump to Windows Vista, but I thought I was ready. I thought "Hey, you're the editor of a top flight tech mag – you should be using the latest in hardware and OS!"

Oh boy, was I wrong.

Getting the hardware together was, of course, easy. We break down so much hardware here in an average month I often think I could build a system in my sleep (though that would displease my girlfriend mightily – thermal paste is tough on cotton sheets), but the hard part was getting Vista going. Actually, getting it 'going' was easy, deceptively so, right up until the second restart after installing drivers for my network gear, when it dutifully told it had no idea what I was talking about. "What? You have to!"

"No!" said Vista. "I don't 'have' to. Nurrry!"

"But... *Crysis*! DX10! More RAM!"

"NURNY!"

Crestfallen, maybe even a little teary, I withdrew the nice new hard drive I'd opted to install Vista on, and replaced my old drive, with my trusty, hoary old copy of XP. At which point I found myself in Windows Reactivation Hell. A special hell, if ever there was one, where you have to talk to Indian call centers that may or may not be undergoing 'unexpected downtime', take down long strings of serial numbers given over a bad phone line by someone for whom English is most certainly not their first language.

In this day and age, I'm still amazed that any PC user must jump through so many damned hoops to use hardware and software that they actually own. It's a refrain that journo's like me have been beating out for years, and it doesn't look like it's going to disappear any time soon.

## David Hollingworth

dhollingworth@atomicmpc.com.au

**NOTE:** The PotBS discs may appear not to work in a Vista environment if Windows Defender is running. Users can either disable Defender and they will work as normal or wait for Defender to finish scanning the disk before allowing it to run. XP users are not affected unless they have OneCare installed.

**ISSUE 86 WINNERS:** KANE & LYNCH PRIZE: N Aroyan, French's Forest, NSW; D Baker, Heidelberg, VIC; D Stohr, Seaford, VIC; B Dunn, Geelong North, VIC; J Tandy, Woronora Heights, NSW. JUMPER TICKETS: Our apologies for this, but Jumper is no longer playing nationally.

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## Games before their time

**James Matson wishes someone would turn off that leaky pirate tap.**

**A**ssassin's Creed for the PC; doesn't it just get you revved up? A game that looked and played so smashingly well on the console is getting ever closer to its PC launch date and in fact, will probably be released by the time you read this. But what's more amazing, is despite an early April 08 release, scores of people have been banging away at Ubisoft's stealthy action game since February this year, all thanks to a leaked beta of the game that found its way onto the equal parts maligned and celebrated online juggernaut that is the torrent scene.

Piracy is damaging to games – though to what extent is up for debate – but early leaking of games can be absolutely devastating to a developer. See, it's one thing to have the polished commercial product out there making the warez rounds; for games companies it's an unfortunate reality that the moment the title is pressed onto CD or DVD, someone – somewhere – is busy converting it into lots of tiny winrar files for easy upload, but it's another ballgame entirely when unfinished or 'beta' game engines are put out there for people to grab hold of.

Like bootleg copies of movies recorded on handy

cams in darkened cinemas, beta releases of games are almost always unfinished, bug-ridden and a poor example of what the finished product will be. The torrent release of Assassin's Creed is no exception, with reports that it has an affinity for crashing every few minutes and lacks any graphic optimisations, resulting in the world's sexiest slideshow of Assassin's Creed, rather than the game itself. Oh, and did we mention it's just plain missing the entire City of Jerusalem level?

The danger in leaked games is all about perception. While the more discerning and educated gamer might be able to understand and ignore these glitches as part and parcel of an unfinished game, many can't – or won't. They'll snap up the 6GB download of Assassin's Creed, play it in its

bug-ridden shame, build themselves up into an Ubisoft-hating frenzy at the instability and swear never to touch the game with a ten foot cattle prod. While you could argue that most of these people wouldn't have bought the game anyway, that kind of bad vibe associated with a game pre-release can and does bite into the overall consumer impression, and therefore bottom line.

Early leaks of popular games have been happening since avenues for distribution existed – top shelf titles like *Final Fantasy XI*, the *S.T.A.L.K.E.R* Alpha build and of course the infamous *Half Life 2* source code are all a part of gaming history. More than one online source has floated the idea that the leaked Assassin's Creed engine came from someone that had access to the game for a preview, but that's unlikely. Most – if not all – games given to external companies for review or preview before release are accompanied with all manner of hardcore copy protection that prevents easy duplication. Reviewers can be given a 'gold disc' (a DVD with a unique electronic signature embedded in the game) which can be traced should the game be uploaded to a warez site, and in some cases a hardware 'dongle' will accompany the title.

What's far more likely is an actual physical breach of security, someone walking out of the Ubisoft office after a hard day's work with an 8GB memory stick and a copy of *Assassin's Creed*, highlighting the fact that even though big developers regularly employ background checks and other security measures on their staff, there's really no accounting for the human factor.

Leaks hurt the developer by way of spreading an unfinished IP amongst the masses, and gamers are left jaded by buggy alpha or beta releases, and at the end of the day, we're all hit by the ugly and sharp stick of rising development costs and choking copy protection as companies desperately try to prevent their products from seeping onto the torrent scene.

**“Leaks hurt the developer by spreading an unfinished IP amongst the masses...”**



ATI answers the call for budget gaming.

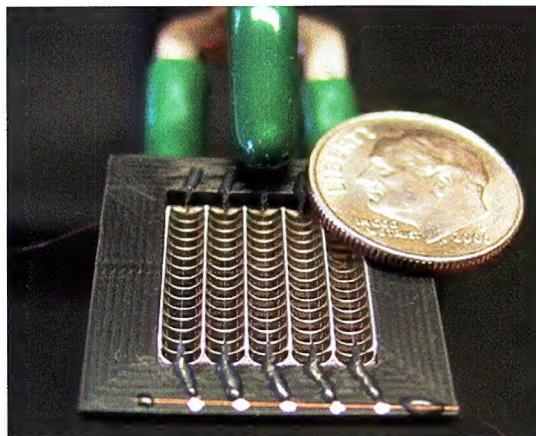
**In an effort to combat NVIDIA's beastly entry level GPUs, AMD is set to launch the ATI Radeon HD3830 based on the 'RV670' architecture, featuring the same shader processor count as the 3850 and 3870, but with a chocked 128-bit memory bus rather than the more sporty 256-bit bus. AMD will be trying to position the card somewhere in the realm of 'cheaper than the Geforce 9600GT, but with more grunt than the 8600GTS'. Sounds like a budget gamer's dream, but along with the narrower memory bus comes rumors that the 3830 will also be restricted to 256MB of graphics memory, putting a lot of next gen games squarely out of the card's performance reach.**

**As if the iPhone wasn't proving popular** enough, its first third party game looks to be Will Wright's already famous yet still in development God-sim 'Spore'. The title, which has garnered a ridiculous degree of interest from gamers hungry for something fresh, will apparently make use of the iPhone's unique control mechanisms like the touch screen and tilt sensitivity. It's rare that we'll get excited about games for mobiles, but this could be seriously fun.

# Corona, not just a beer

Solid-state cooling is on the horizon.

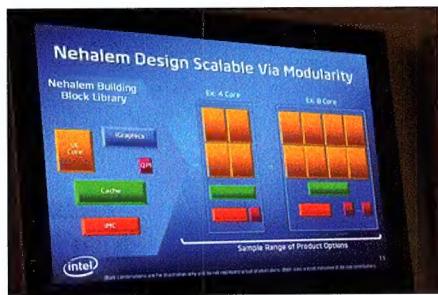
Hold onto your keyboards and try desperately not to sweat into your ThinkGeek t-shirts. A cooling revolution touted as the biggest breakthrough since the heat pipe is on its way thanks to a pair of engineers from Thorrn Micro Technologies Inc. The solid-state device has the power to cool a 25-watt chip while remaining smaller than one cubic cm, with the development roadmap looking to eventually create self cooling chips. Based on the phenomenon of 'Coronal Wind' the device relies on live wires placed within uncharged conducting plates that produce micro-scale conductive plasma and in turn produces airflow. Thorrn Micro Technologies is talking up their new toy, claiming it can move more air than fans 30 times



its size and could represent the next logical step in cooling, particularly for mobile and notebook technology.

# Threading the Nehalem

Intel goes back to Hyper...bole. See what we did there?



Intel has been busy releasing some additional information about its new CPU lineup in the lead up to its 2008 Intel Developer Forum (IDF) in Shanghai. While the six-core, 16MB L3 cache 'Dunnington' CPU (bearing little relation to the quaint village in Northern

Yorkshire of the same name) is a tasty bit of silicon love, it's aimed squarely at the server market, so most users are keeping their finger on the pulse of the 'Nehalem' desktop chip. Apart from the obvious increase in cores – with the Nehalem at release being scalable between two to eight cores – and a nod to AMD architecture in the inclusion of an integrated memory controller, there are a few additions to the Nehalem that could prove less than stellar in practice, like the return to Hyper-Threading (HT). With an eight-core Nehalem CPU potentially executing 16 threads simultaneously, it sounds fine in theory – but we all remember the largely ineffectual performance of HT in older Northwood Pentium 4s, so only time will tell if it's anything to get excited by.

**The Wii remote was (and still is) a cool idea** as far as getting gamers to feel like they're 'part of the action' – but a device that induces electric shocks every time you're punched or shot in a game? That dances a little close to the edge of discernible fun-factor as far as we're concerned. Mindwire Limited has released the Mindwire V5 for \$US200 that'll do just that, with ten adhesive pads that can be placed on your arms, legs or stomach and compatible cabling for the PC, Xbox, GameCube and Playstation 2. The higher range zaps that the Mindwire V5 can produce aren't what interest us, we're looking more to the

lower settings it's capable of – apparently producing soft 'massaging' sensations. Oh yeah, shoot me baby.

**AMD is rarely a source of feel-good news** of late, with the recent announcement of a five per cent workforce lay-off adding to the sense that the former enthusiast chip market favorite is struggling to stay in the game against rival Intel. The reduction of some 800 staff from its 16,000 workforce comes as the company looks content to break even in 2008 Q2, and hopefully turn a profit in Q3.

## Pipeline



### Tom Clancy's Endwar

Q3 2008

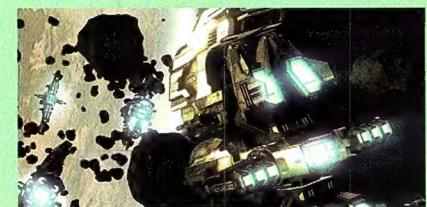
The Tom Clancy franchise has been responsible for some pretty solid additions to PC gaming over the years, but the latest title to bear the Clancy name looks set for a console only release. *Tom Clancy's Endwar* is a real time RTS set to give us a World War 3 scenario to play out combining near-future weapon systems, voice commands and fully destructible environments. While an RTS release on consoles is always a dicey prospect, Michael Deplatter (*Rome: Total War, Medieval: Total War* et al) is creative director on the project, giving *Endwar* every chance of success. Of particular tastiness is the MMO style online campaign mode, where players around the world – through their individual battles – will contribute to a 'global' war effort, collectively advancing or falling back as a combined force.

[Platform] PS3, Xbox 360

[Developer] Ubisoft

[Publisher] Ubisoft

[Web] [www.endwargame.us.ubi.com](http://www.endwargame.us.ubi.com)



### Black Prophecy

Q4 2008

Prophecies are a nasty business, always throwing a spanner in the works of our daily lives through the foretelling of dark armies, dragons re-born or freaky kids with 666 tattooed on their scalp. *Black Prophecy* however, features none of these things, instead promising an action MMO based in the vast regions of space, where genetically enhanced species push for total domination of humankind. Trust us, the plot doesn't bear going into, but *Black Prophecy* could be serious competition for that 'other' space MMO. Created in close collaboration with science fiction writer Michael Marrak, *Black Prophecy* brings the promise of clan-based space stations and epic capital ship battles to thousands of players, and if pure looks could kill, the sleek graphics of *Black Prophecy* could take *EVE: Online* out the back and beat seven shades of inter-dimensional crap out of it.

[Platform] PC

[Developer] Reakkor

[Publisher] Reakkor

[Web] [www.blackprophecy.com](http://www.blackprophecy.com)

# Atomic LIVE Forum Brisbane!

Atomic went north of the border for some tech talks and fun times. David Hollingworth reports.

There are few better ways to spend an evening than talking tech over a couple of beers with some good mates. How much better then, is it, when you can spend a similar evening with four clued-in (and entertaining) IT industry professionals, over 170 happy Atomicans and a handful of staff from Atomic HQ? How much?

This... much!

What we're talking about is the recent Atomic Live Forum: The Future of PC Gaming, held in Brisbane at the Queensland University of Technology on the 13th of March. From the outset we had high hopes, and with sponsors like Samsung, ASUS, AMD and Microsoft, and spokespeople from each, we felt justified. The doors to our hall opened at 5pm and the rush of Atomican bodies was like a wave of pure win. Familiar faces were waved at, familiar forum names were finally matched to faces, and as the rush reduced to a steady trickle, we got underway.

Proceedings opened with a small talk from the Course Co-ordinator for the Bachelor of Gaming and Interactive Entertainment at QUT. She outlined what her course had to offer, and mighty good it looks too - we even had a few attendees present who were able to vouch for its coolness. Then the main (well, kinda) part of the evening kicked off with Amy Prince from AMD. She was always going to have a rough time presenting AMD's case to the Atomic crowd, but she did a great job, outlining AMD's current successes and future objectives in CPUs and gaming. ASUS was next off the rank, with a wonderful demonstration of the



true effectiveness of PowerPoint as a presentation tool. Sean also managed to outline ASUS' motherboard activities, and the boost they give system performance, in between cracking up the audience. It was then Simon King from Samsung's turn to woo the crowd, and woo he did! Simon presented a seemingly endless string of impressively large numbers, exceedingly flexible monitors, and remarkably cute Korean girls. Finally, Professional Geek Nick Hodges took to the stage to share his passion for computing and gaming and everything techy. His cat was a big hit.



With the presentations over, it was down to the serious stuff - and only the Guild Bar would do for that. We all adjourned there, where Amy was harassed by Intel fanbois, Nick beat everyone at pool, and Simon proved that he could keep up with uni students any day of the week. It was a wonderful end to the evening, an elegant sufficiency of friends, drinks and tech. A perfect Atomic night.

Major thanks to everyone who attended. We've got a couple more of these planned for the year, so keep an eye on the forums!

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## Doctor Guy Porter, VIDEO GAME VIOLENCE RESEARCHER

**David's Hollingworth and Field have a chat with a leading opponent of the ever-vocal Jack Thompson.**

**atomic** What motivated you to do your research into violence in games?

**Dr Guy Porter:** Curiosity. Plus the numerous claims by Jack Thompson and others that high school shootings are caused by violent video game use. As a mental health clinician I was interested to find out if such games really can alter someone psychologically in such a drastic manner.

**atomic** What did your research entail?

**Dr Porter:** A review of previous research studies.

**atomic** What findings has your research uncovered?

**Dr Porter:** Previous studies have suggested an association between use of violent video games and aggression with a possible bi-directional effect. In other words, while certain games may make some individuals more aggressive, it is equally likely that these individuals will choose to play violent games in the first place. Therefore it is difficult to separate cause from effect. This finding appears to be more significant for young children than adults. Existing studies tend to be of a poor quality and are by no means conclusive. There is a need for better designed, longer-term studies.

**atomic** Can we say that there is a link

between violent video games and violence in the real world?

**Dr Porter:** It is very difficult to establish a link between the use of violent video games and real world acts of violence. This is because there are so many other variables which have not been controlled for in previous research – these include social factors such as drugs, alcohol, mental illness, access to guns, and so on.

**atomic** How many of these studies look at other factors, such as upbringing, parental oversight, and so on?

**Dr Porter:** There are decades of research into TV and film violence – including studies which have controlled for these and other factors. However I am not aware of any studies into violent video game use that have looked at these factors. Video games (particularly the current generation of games with realistic graphics) have simply not been around long enough to study properly.

**atomic** Where studies have found correlations between violence and players of violent games, how do the results stack up against other violent media (television, news broadcasts etc)?

**Dr Porter:** Large and well-designed studies have shown that childhood exposure to TV /

film violence predicts subsequent aggressive behaviour in adulthood. These studies have involved following groups of children for 15-17 years (ie, from childhood into adulthood) and have controlled for other potentially confounding factors such as parenting style, socio-economic status, and mental illness. These studies are widely regarded as the most convincing form of evidence for establishing a link between media violence and aggression. However, such studies do not yet exist for video games.

**atomic** With reference to the studies sighted by Jack Thompson, how is the methodology of such studies flawed?

**Dr Porter:** Jack Thompson's case has been greatly supported by the work of Dr Craig Anderson, a psychology professor from Iowa University. Anderson himself actually testified before a US congressional committee in 2000 stating that violent video games lead to increases in aggressive thoughts and emotions. Anderson has done some experimental work which we regarded as suffering from methodological problems (described in my paper – noise blast experiment).

Anderson also did a meta-analysis of the existing research and published his findings in 2004. A meta-analysis involves compiling all the



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data from different studies and looking at it as a whole. His conclusion was once again that video games lead to aggression. However his meta-analysis included many poor quality studies with small sample sizes. Furthermore, some of the studies were from the 1980s using 2D games which would not be considered 'violent' by today's standards.

Interestingly, in 2007 a similar meta-analysis was published by a different researcher (Ferguson) contradicting Anderson's findings. Ferguson concluded that the current research literature does not support the notion that video games lead to increased aggression and that instead video game use was associated with improved visio-spatial cognition.

**atomic** How would a personality (such as Jack Thompson's) reconcile their views in light of them being based upon faulty research?

**Dr Porter:** Jack Thompson is also against children being exposed to the sexual content in certain video games and is an advocate for correct classification and parental supervision. So he is not all bad. However, I think that directly linking video games to school shootings is overlooking other more important factors – such as mental illness or psychopathy in those who commit the crimes as well as access to guns.

**atomic** What has to be done before we have conclusive proof of the effects of violent video games?

**I can sense that the gaming community is looking for someone to counteract Jack Thompson...**

**Dr Porter:** 'Proof' is a strong word. More conclusive evidence will need to come from long term studies similar to those carried out for TV/film. We concluded that based on the current evidence, people who have pre-existing aggressive tendencies would be best advised not to play particularly violent games.

**atomic** How would those studies be carried out, and over what time period?

**Dr Porter:** 15-20 years as for the TV/film studies.

**atomic** Have you found any positive influences from playing games?

**Dr Porter:** There are a number of research studies in the medical literature about the positive aspects of video game use. There is some evidence that video games improve hand-eye coordination and surgical skills. Video games have also been shown to be effective in pain-distraction in children with cancer. We use consoles (usually Nintendos) in hospital quite a lot for our younger patients. It takes the dullness out of being in hospital!

**atomic** What studies are you currently involved in, and how are you carrying them out?

**Dr Porter:** We are now turning our attention to the issue of video game 'addiction' – however we are avoiding that word and using the term 'problem use'. Various media reports and websites such as [www.wow-detox.com](http://www.wow-detox.com) suggest that there are some gamers for whom gaming represents a 'problem' – specifically related to excessive use. As mental health clinicians this is very interesting to us. I have also had several patients who use video games excessively with various negative consequences.

**atomic** Tell us a bit about your current project.

**Dr Porter:** We are running an anonymous online survey for video gamers from all backgrounds to take part in. The survey is divided into 2 parts. The first part focuses on demographics, types of games played, patterns of use, and any negative consequences noticed by the gamer due to the amount of time spent playing. This includes relationship problems, reduced work/study performance, and others. The second part of the survey asks you how you have felt over the last 7 days and is not necessarily related to video game use.

The response so far has been excellent and very positive. Some gamers have been concerned that we are trying to portray the gaming community in a negative light – but this is not the case. We are trying to generate data

about patterns of use in order to understand what exactly is 'problem use' and what can be done about it. The study is not funded/sponsored by anyone and is for academic purposes. Our senior investigator is Associate Professor Vladan Starcevic from the University of Sydney and has full ethics committee approval.

**atomic** Have there been any others like it conducted, and if so, what were their findings?

**Dr Porter:** Yes there have been similar studies previously using the online survey methodology. Nicholas Yee from the US has done some excellent work on MMORPGs. As a media researcher Yee focuses on the societal aspects of these games. The strongest motivational factor for playing MMORPGs appears to be the ability to socialise. Other researchers have looked at the consequences of excessive use and have tried to define it. Results suggest that a minority of gamers may have difficulty controlling the amount of time they spend playing with resultant negative impact on their

capacity to function in the 'real' world. Debate currently rages in medical circles about whether such 'problem use' should be classified as a mental disorder. Recognising the problem may enable us to help certain individuals but could have medicolegal implications. Part of our study is to determine exactly what is meant by 'problem use'.

**atomic** What would be classified as addiction?

**Dr Porter:** The term 'addiction' has historically been used in medicine to describe drug dependence and other so-called 'behavioural addictions' such as pathological gambling. It basically refers to a situation in which the individual loses the ability to control or moderate their use of a particular substance or activity. There must also be some detrimental effect on their social/occupational/academic function as a consequence. However, the word 'addiction' has many negative connotations and in many ways is going out of vogue in medicine. In our video game use research project we are avoiding the word altogether – instead we are using the concept of 'problem use'. Once again we are aware from the current literature that this term likely applies to only a small minority of video game users.

**atomic** Is gaming addiction a chemical-based addiction?

**Dr Porter:** More research is needed in this area. The brain is a complex organ! I would speculate that video game use activates dopaminergic reward pathways in the brain, although the play of neurotransmitters is undoubtedly more complex than this. Certainly video gamers report feeling relaxed and content when they play. However it is probably not reasonable to compare video game use to the direct physiological effects of a drug such as heroin or alcohol.

**atomic** Would you like to reveal any preliminary results?

**Dr Porter:** We are not releasing any preliminary results at this stage. Results will be published in a peer-reviewed medical journal once the survey is complete.

**atomic** Are you a gamer yourself? Pwn much?

**Dr Porter:** I don't mind flight simulators. When I was a teenager I used to play *Ultima 4*. My fiancée is an avid gamer so I'm familiar with all the recent games – I am certainly not an outsider. I can sense that the gaming community is looking to find someone to counteract Jack Thompson. I may not be that person but I am someone who is trying to take a more balanced approach.

To be a part of Dr Porter's research study into video game addiction, check out his URL: <http://www.nepean.med.usyd.edu.au/research/psych.php#res>

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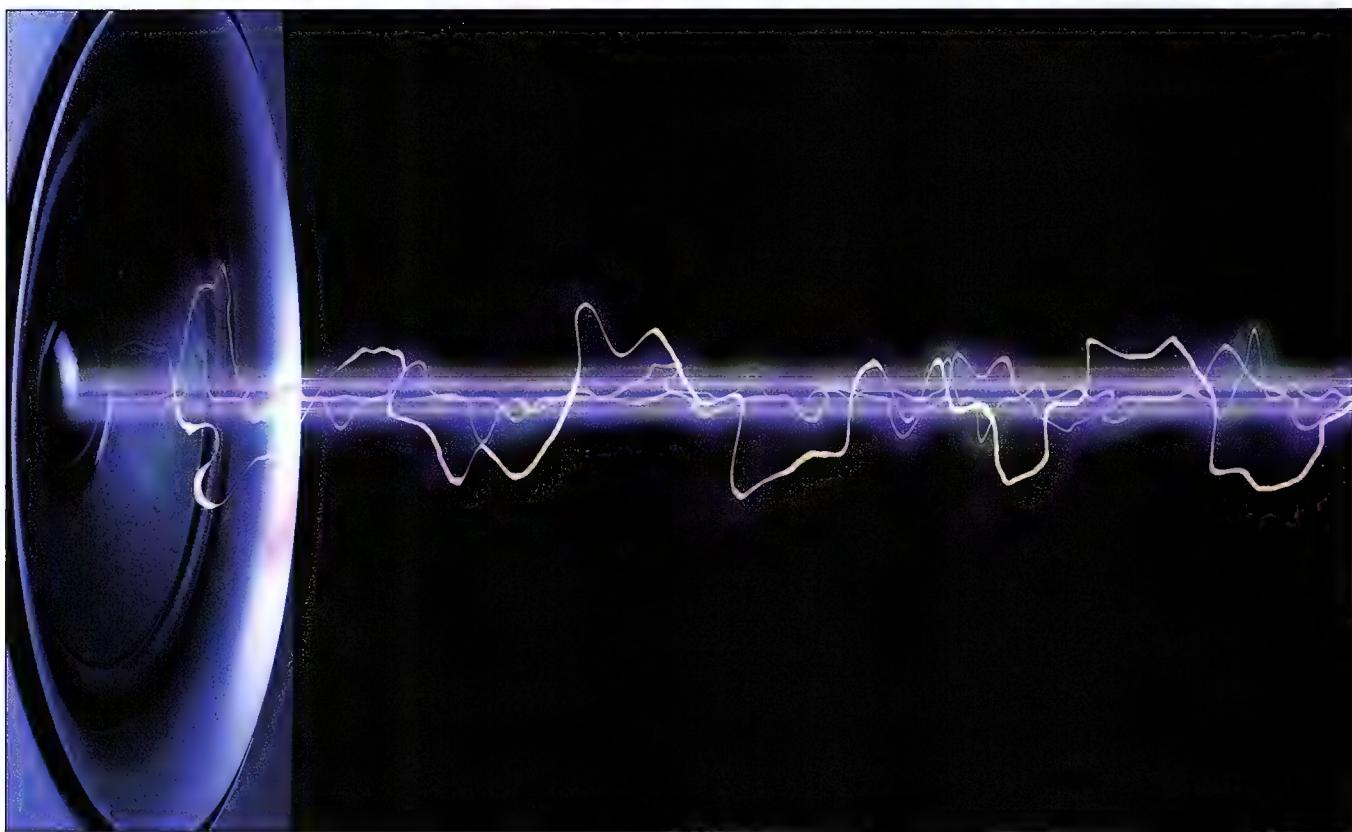
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# Science of sound

While we love our PCs we don't always love the noise that comes with them. What's going on inside your case, and what can you do about it? **Ashton Mills** investigates.

This time we're not going to look at the production of sound, but rather stopping it – seeing just what it is within your PC's case that's making all the noise, how the nature of sound affects what you hear from your PC, and the techniques to silence it.

## Compression and matter

In short, sound is a waveform that propagates through matter. More distinctly, and as we frequently know it, sound is compression waves – generated for example by a source that vibrates, such as a speaker cone – that travels through any substance that can conduct its energy. As a waveform it has properties such as frequency, wavelength, amplitude, intensity, and speed – and we can measure the propagation of sound by how fast it travels.

Different materials conduct sound waves differently. Solids, and especially metals, can comprise tightly packed molecules that conduct sound very well, which is why you can feel vibrations on train tracks while the train is miles away. But density isn't a defining factor; atomic structure plays a role. Lead is dense for example,

but an excellent sound insulator. Technically, compression waves that conduct into a solid can become transverse waves. The difference between compression and transverse waves is that compression waves are fluctuations of equilibrium pressure in substances like gasses and liquids, where molecules can move more freely, whereas in solids the wave energy can also be conducted through what's known as shear stress – energy conducted along and through a material, instead of against it.

Liquids and air are less effective than solids, and temperature plays a role too – cold air conducts sound slower than warm air, for example. In fact, as you can see opposite, a solid like iron conducts sound some fifteen times better than air, and even water is five times more effective. This means it also travels further, and is why sea creatures that rely on sonar can sense over very long ranges.

Hearing sound is a similar principle to generating it: in its simplest form, vibrations in the air reverberate a membrane in your ear, which reverberates tiny structures inside the ear culminating with the cochlear nerve which, in turn, translates this to electrical impulses for the brain.

As they travel waves get weaker, with their

amplitude or 'loudness' decreasing as a square of the distance from the source, at least in air.

In the absence of matter through which to propagate, sound waves cease – which is why there's no sound in the vacuum of space, despite what just about every sci-fi movie or TV series would have you believe!

When it comes to sound generated by our PCs, which we generally refer to as *noise* because we don't like this particular type of sound, there's not much we can do about distance, as we frequently sit so close to the source. However there is plenty that can be done to reduce or absorb noise before it reaches our ears.

## Sources of noise

There are many sources of noise in a PC, a veritable plethora even. Some you know, while others are less obvious.

The main sources are usually the PSU, CPU fan, case fans, and GPU fans but not always for the reasons you might expect. Fans, on their own, can be quite quiet even at high speed – the noise problem starts when you obstruct the airflow. The noise fans cause is usually generated as a result of air turbulence caused by being blown through



Honeycomb grill on a PSU.

obstructions like fan grills and, in the case of the CPU, the CPU heatsink.

Ostensibly, there are various 'solutions' to this, such as ensuring a minimum distance between fan and the nearest surface (which good CPU heatsinks will exhibit), and 'honeycomb' fan grills like you frequently find on power supplies, all of which work to varying degrees of success.

Another big source is, of course, GPU fans, especially on high-end cards. At full power, these babies can make a jetplane sound like a butterfly, but with good reason: they generate an awful lot of heat and it's either dissipate the heat, or burn up. Especially for overclocking enthusiasts. This is the reason GPUs have their own fan management to spin them only under load – which is good, because that generally means you're doing something like playing games and the sound from this is probably drowning out the sound from the fans.

Hard drives have also been a big culprit for a long time, mostly notably while seeking but all also while simply humming along. The more drives you have, the more noise you'll get.

Finally, there's resonance. This is a frequently overlooked culprit – fans and especially hard drives produce vibrations which can be conducted by the chassis of a case; refer above to transverse waves. As a rigid metal structure, and with fans and drives screwed in, the vibrations are easily propagated and the case itself becomes a progenitor of sound waves as it vibrates the air around it: if you place

a finger on a metal part of the chassis while the machine is on, you can usually feel them. And, the more fans and drives you have the more resonance your case will conduct.

PC noise can be such a nuisance that it's been included under the banner of ergonomics, and thus in turn an essential topic to look at when designing a comfortable, and non-detrimental, PC environment.

## Quieting a PC

We won't go into this in-depth or cover all the products you can use here; that'll be for a feature and reviews at a later date, but in short there are a number principles you can follow to reduce the noise your PC makes based on an understanding of the nature of sound waves and how they propagate.

First and foremost, the golden rule: it is better to stop a noise at the source than trying to silence it after. In other words, start by looking at which noises you can reduce at the source (slower spinning fans, for example) or eliminate completely. Core options here include GPUs and hard drives (more on this below), but can also include the CPU if you use a very low-power chip (something you might consider for an HTPC, for example). Mainly, don't use a boatload of fans inside the case just because you can – keep them to a minimum without compromising your airflow through the case, which may require good layout for your components and cables within the chassis, or buying a case with good airflow; more and more cases these days are being designed with this in mind.

But if you can't prevent the noise in the first place, your only avenue is to try and reduce it. Here are some tips for each subsystem:

**CPUs** – The faster a fan spins, the more noise it makes. Larger fans can spin slower than smaller fans but push the same amount of air. Therefore it's a good idea to use as large a fan

## SOUND CONDUCTIVITY AS SPEED

Substance	Velocity (m/s)
<b>Gasses</b>	
Hydrogen (0°C)	1286
Helium (0°C)	972
Air (20°C)	343
Air (0°C)	331
<b>Liquids</b>	
Glycerol	1904
Sea water	1533
Water	1493
Mercury	1450
Methyl alcohol	1143
<b>Solids</b>	
Diamond	12000
Pyrex glass	5640
Iron	5130
Aluminum	5100
Brass	4700
Copper	3560
Gold	3240
Lucite	2680
Lead	1322
Rubber	1600

Note the ordered structure of diamond conducts sound best.

Source: *Hyperphysics at Georgia State*.

as possible where you can when it comes to cooling – especially for an area where you expect it's going to spin up to full power under load, like on the CPU. So, unless you really need a compact heatsink and fan solution, always buy a CPU heatsink that takes a 120mm fan, or larger if you can get it.

**GPUs** – There's no free lunch so don't expect to be able to get a high-end card, overclock it, and run it under load and not be making a noise. If you want to remove this source of noise, get a passive heatsink-cooled card, but be aware this means it won't deliver top of the range power and it probably won't be clocked high. That's the trade-off. Easily viable for HTPC setups, however.

**PSUs** – Ostensibly there have been over the years a number of 'silent' PSUs that usually forgo the fans for whopping great big passive heatsinks. They do work, but come with some caveats: firstly unless the heatsinks extend outside the case, you'll still need airflow cooling inside, which means you still need fans somewhere nearby (possibly negating the whole point of removing the fans from the PSU in the first place). Secondly, since the



A passively cooled GPU from ECS.



Silverstone's 'silent' PSU, one big passive heatsink.



Sound dampening material from Acoustipack.

PSU's heat comes directly from providing power for your box, the more juice it gives the hotter it's going to get. Usually, this means 'silent' PSUs are limited to low wattages (400W or less) and may not be enough to power your beast. In this case, stick with high-powered PSUs, but follow the advice above for CPUs and choose one that uses a 120mm fan and not one or two 80mm fans.

**Grommets** – Rubber and silicone grommets are a mainstay of quiet computing; these absorb vibrations and thus, in turn, reduce resonance. A good case designed with silence in mind will come with rubber grommets for hard drives and sometimes fans as well. Alternatively, grommets for fans are easy to find as fans have a ubiquitous attachment for cases. Hard drives can depend on the hard drive enclosure for the case, but usually you can find grommets to fit. Ideally, every hard drive and every fan needs to be attached with grommets to minimise resonance. If you're crazy, you can do the same for the PSU and even GPU cards (remembering their high powered fans), using silicone separators to screw them to the chassis backplane.

**Cases** – There's two types of cases you can look at: those with good airflow, which can direct cool air where it's needed most or help to minimise the need for fans; and cases that are designed to be one gigantic passive heatsink. The former you'll find in varying degrees from quite a few case manufacturers. Shop around, and look carefully at the inside shots of a case on websites for the models you're interested in. Analyse where you'll put components, and how the air is going to flow through. For the latter there are cases like Zalman's TNN, which is quite literally one gigantic passive heatsink with internal heatpipes to directly connect components to the heatsink-case. These cases are probably quite effective, not to mention supremely heavy, but come with the caveats that they are usually very expensive and a pain in the bum to setup (for example, removing a GPU's fan and heatsink assembly in order to connect it to the case heatpipes). Then again, if you have the money to buy one of these you can probably employ someone to build it for you too.

drive bays). Generally these products do work, but don't expect miracles. It's unlikely they'll 'silence' a sound, but they can muffle it and reduce it so that you don't notice it so much. As usual, there are some caveats: firstly, more effective materials will generally take up more area – more mass – but you don't always have a lot of area free inside a case, especially on the side panels. Secondly, because they literally insulate bare metal edges of a case, hot air inside is less likely to be cooled through heat conduction and convection (see X-Ray 'The Cold Universe', Atomic issue 74) to the outside, and so ironically sound dampening materials can raise the inside temperature of a case – which might result in fans spinning faster to expel hot air. No free brunch, either, eh?

**Baffles** – Baffled by baffles? Ironically, even a good sound-proofed case usually leaves one side untouched: the rear. It's impossible to line the inside rear of the case as it's usually flush with fans and external connections for the motherboard and plug-in cards. Especially with exhaust fans, their noise goes right out the back and bounces off the nearest wall on its way to your ears. The solution is to use a baffle, but these are extremely hard to get – Silverstone used to sell one (the SST-PP02) for PSUs, but this doesn't prevent sound from external fans as well. Plus, the problem with baffles is that by design they create an external enclosure outside the case which can, sometimes, inhibit airflow out – somewhat defeating the purpose of the fans and possibly causing them to spin faster and produce more noise as more heat is expelled. However, we're sure a good design is possible – perhaps we'll get Ron onto the case (pun)!

There's plenty you can do to help save your ears from PC noise, it just takes a little careful planning, sometimes hand-picked products, and of course a better understanding about the nature of sound. 

“...there are cases like Zalman's TNN, which is literally one giant heatsink.”

**Hard drives** – Use drives known to be quiet, like some of the Samsung range and recent Seagate drives. Alternatively, try drives designed to be quiet like Western Digital's new 'green' drive, which is quieter by virtue of its methods for saving power – but which again can come at a performance cost. Pretty soon now SSDs are going to become standard, and these are the first mainstream storage devices for PCs that are literally completely silent – no spinning platters, no actuator heads. Silence is golden, or at least silicon. If you can't wait until then, you can buy SSDs now in sizes from 16GB to 64GB, but they come at a pretty penny.

**Insulation** – AKA sound proofing. There is an entire industry devoted to silent computing and key to it is the range of sound dampening materials you can buy to line a chassis. This is the last bastion of defence against noise – when you've done all you can do and various components are still producing noise, however small, those sounds are travelling from inside the case to the outside; unless you stop them before they can. Sound dampening materials usually consist of foam and rubber – unstructured substances whose molecules don't conduct sound waves well – and can be attached as lining to the inside of a case (top, bottom, side panels, and even



Zalman's TNN500A, an even bigger passive heatsink.

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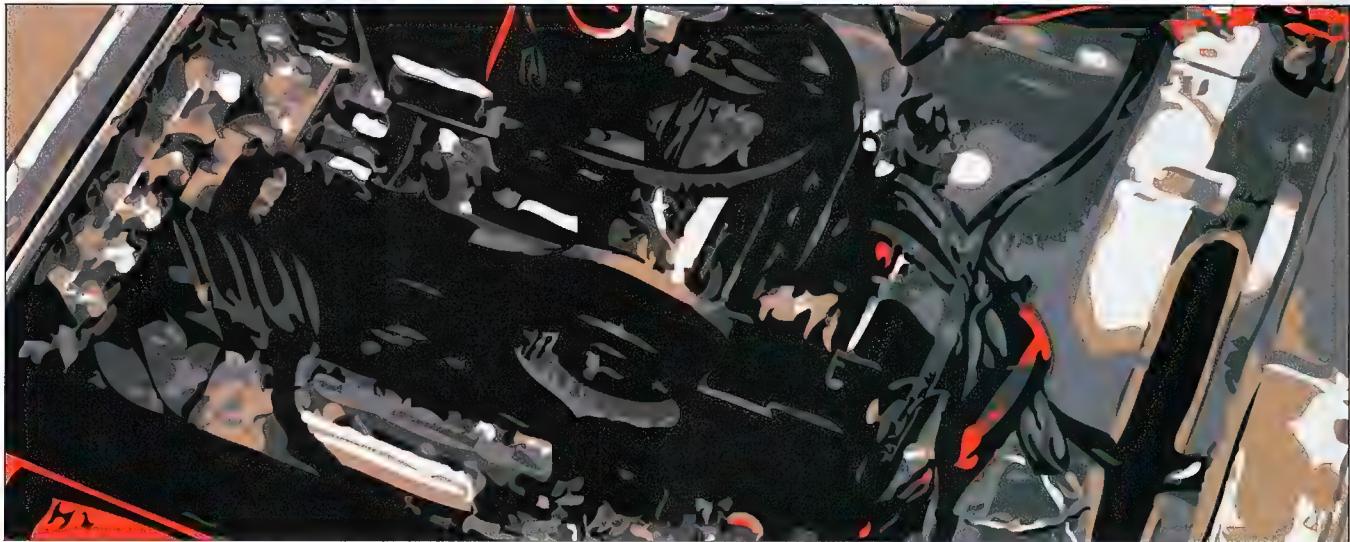
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# Lies, damn lies, and hardware

Ashton Mills ponders the state of the average gamer's hardware rig.

While Valve's Steam was a great big PITA when it first arrived, it's since matured into a good distribution and games management system. I find myself preferring to buy games from Steam because somewhere in my genome I have the can't-be-assed gene, and going outside to actually buy something feels counter-productive. Buying online I don't have to leave my chair. But I digress.

One of the more interesting features Steam has enabled is the hardware survey ([www.steampowered.com/status/survey.html](http://www.steampowered.com/status/survey.html)). Obviously it's a useful tool for Valve to gauge the capabilities of hardware and in turn the target market of the games it (and other publishers) produce. But it's also a fascinating insight into technology trends. At the time of writing the survey comprises responses from 1.3 million gamers from around the world. Let's see what we can glean.

Last year in the survey, AMD and Intel were almost neck and neck. Now Intel's Core2 Duo has seen Intel take the lead with a 15 per cent margin. And with Phenom being a bit of a let down, we can only expect this to grow in the coming months.

That said, despite dual-core processors from both AMD and Intel being available for a while now, two-thirds of the machines in the survey are still single core. Just over a third have dual-core, and just four percent are quad-powered.

In graphics NVIDIA dominates with just over a 60 per cent share, and of these the 8800 line leads them all, which shows how eager gamers are to upgrade to the latest GPUs. Just over a third are ATI/AMD based, and here the Radeon 9600 is on top. Keeping in mind it's a global survey, and not every gamer has a large disposable income, it shows how a large chunk of the audience is still on older systems, with just over 30 per cent still using AGP and 60 per cent with 256MB or less of VRAM. In fact, large 768MB cards (aka GTX or similar) are less than three per cent; not quite as common as you might think. If Valve or other developers use this as a guide, there's not much call to produce games with high-res textures that might require 768MB or more, since so few have the hardware to utilise it.

Now Intel's  
Core2 Duo  
has seen Intel  
take the lead  
with a fifteen  
per cent  
margin.

It's a similar picture (pun!) for widescreen monitors – while widescreen users know that once you go wide you can never go back, most of the gaming world hasn't cottoned on yet, at least going by the survey – just under a quarter use 16:9 displays, leaving almost a million of the respondents on 4:3 screens. However, one interesting trend here is the choice of widescreen display; the highest percentage goes to larger than 24in monitors (aka 27in and 30in), though 24in comes a close second. Clearly when gamers do decide to go large, they don't do it by halves. Perhaps there's a chunk of Atomic readers wrapped up in that statistic!

In audio land the reigning champion is Realtek AC97, forming 30 per cent of all machines. The X-Fi? Just under three per cent. Even if you consider the survey to just be a snapshot of Valve's market, it's clear the audio wars are over – and why not? Onboard sound has come a long way, and easily suffices for everyone except the purists.

Finally, the survey is very telling on Vista's penetration, or lack thereof. Even after a year Vista has a dismal showing, with just over 15 per cent of the machines sporting Microsoft's latest. Even less have DX10 enabled cards, with just nine per cent of respondents capable of using DX10. By contrast XP commands 80 per cent of the audience, over a million users in the survey. DX10's uptake is definitely hindered by Microsoft's decision to build it only for Vista, a strategy designed to try and drive Vista adoption. It clearly didn't work.

There are other interesting trends, more than I can cover here. Suffice to say it's probably one of the first global, gamer-focused, ongoingly (is that even a word? –ed) (no sub-ed) updated surveys made possible via current technology, and a good representation of the same. See where you sit in the community, and check it out.

Ashton loves a good survey like an MMO fan loves XP.  
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# So you wanna be a game

# maker?



Fancy yourself as the next big thing in game development? If so, James Matson has the knowledge and advice to get you crafting.

**I**t's a lazy Saturday afternoon, and the only thing that seems right is to fire up *Unreal Tournament 3* for a dedicated bout of Minigun carnage. As you climb on your hover board and begin speeding towards the enemy flag it hits you: something is missing.

*UT3*, for all its action packed mayhem, is lacking something vital, a component that would elevate the game beyond awesome and into the realm of Godly.

*Testosterone-charged flying death-monkeys.*

But what can you do about getting winged Apes slotted into a game? A lot if you're willing to delve into the world of amateur game development; and why do the legwork when Atomic is willing to go the extra mile and do it for

you. With that in mind, we've de-mystified game creation as the sole pursuit of rich people with advanced programming degrees.

Sure, those things don't hurt, but you can achieve a lot without them. The world of amateur game development is huge, with titles being churned out by massive co-operative efforts, small teams and even solo nerds hiding out in back bungalows. Since the time when freeware was called 'public domain' and 'distribution' was how many floppy disks you could stuff in your jeans pocket, hobbyists and beginners have been crafting games under the amateur and 'Indie' (Independent) banner. Sometimes the results reek, sometimes they're pure gold, but if you bring the talent, we'll lay out the tools, the methods and even advice from the pros themselves to get you started.

# The Tools

## Game Maker

Having great ideas without a way to implement them is about

as productive as wearing your pants on your head – although less likely to get you shipped off to a psych ward. If you're a complete beginner, Game Maker (GM) is a fine starting point. It's been around since 1999; spanning six major revisions developed and published by Mark Overmars, with the newest addition – GM 7 – published by YoYo games.

Written in Delphi, GM is the champion of showing users that you don't need to have much of anything beyond an idea to start making a game. It's probably important that we shatter your dreams of the next *Call of Duty* title early on, though, as Game Maker won't come close to producing that standard of software, with its primary focus on simple 2D games like the shoot-em-ups of yesteryear. There's a purchasable 'Pro' upgrade that technically allows you to muck around with 3D environments, but the support and implementation causes much teeth gnashing, we'll look at the 3D suites further in.

So why mention this simplistic tool? Because it's not intimidating, and for someone setting out on the road of getting game ideas out of their head and onto the screen, that can be a powerful motivator. Developing a title with Game Maker can – if you want it to – completely obfuscate any and all



## PRO ADVICE

**“Besides the tech stuff, keep in mind that you can no longer get away with just the bells and whistles. You need to say something with your game concept that actually raises some eyebrows: think outside the box. We could very easily have made *World in Conflict* a stereotypical boring run-of-the-mill wargame, but we worked hard to make the story and setting delve into the unexpected and have it genuinely surprise the player.”**

**CARL LUNDGREN, LEAD LEVEL DESIGNER, MASSIVE ENTERTAINMENT**

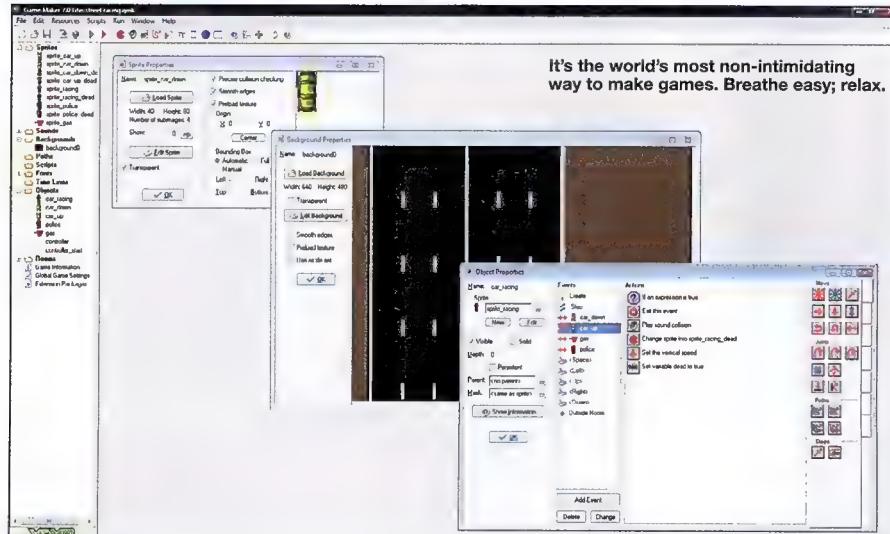
programming and technical wizardry from the end user, employing a drag-and-drop interface for putting graphics, audio and objects into the world, using the same simple methods to assign behaviours to them. Unfortunately for all its ease of use, the resulting executable can be disgracefully bloated, and the performance pretty abysmal.

If you've got some programming skill, you can expose Game Maker's inbuilt 'GML' language (structurally close to C in its use of code blocks, function calls and syntax) giving you greater control over what you can do with the engine. There's a massive community behind Game Maker thanks mostly to its venerable age, with no shortage of online tutorials and projects to get you started. When all is said and done, Game Maker is the McDonalds Qtr Pounder of the development world, fast, cheap fatty and altogether cheesy.

### Where to get it:

[www.yoyogames.com/gamemaker](http://www.yoyogames.com/gamemaker)

**Suitable for:** Total beginners and those with code-phobia.



## Unity

Apple users can feel love, respect and good vibrations thanks to a native OSX game creation tool, Unity. It's a complete suite, containing everything you need to churn out polished games with bells and whistles. While you still need access to applications for art, sound and asset creation, Unity will look after the level design, physics, GUI creation and even multiplayer/network interface.

Its big plus comes in the form of being able to deploy Unity-created games to the Windows community, while taking advantage of the ever-growing popularity of Apple, too. Unity shares a common trait with more simplistic engines like Game Maker, in that it initially hides the core of the SDK from the end user and you'll do most of the work via the Unity editor, a charming drag-and-drop affair, albeit with a steep learning curve.

If you're willing to lift the lid you'll be rewarded. The engine is powered by Mono, an open source collection of .NET compliant tools and libraries. The scope of Mono allows the budding game maker virtually limitless freedom to prod, poke and rework games on the 'ground floor', doing everything from dedicated network coding to integration with PHP code or SQL databases via their choice of JavaScript, C# or the Python derivative 'Boo'.

Now that's choice, and choice is power. Of course, the real attraction comes from the fact it can produce 3D games. Sure, titles like *Puzzle Quest* prove that 2D can still be made playable and fun, but the demand for high-powered visuals and effects is such that only 3D is up to the task. Unity offers a polished feature set in this regard, with particular focus on lighting and shadow,



# READY TO TAKE OFF

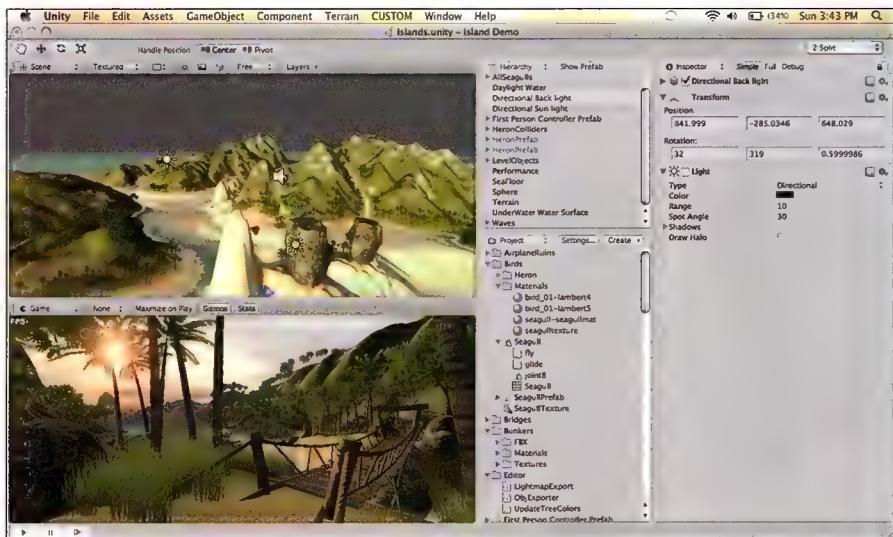
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We'd love to say we made that terrain, but it came with the Unity editor.

spitting out an impressive list of support for soft shadows, baked vertex lights and 'light cookies' which – unlike the name suggest – are not a clandestine codeword for hash biscuits, but a nifty way to add lighting detail to your game, creating patterned shadows directly from light sources (like sunlight peeking through dense foliage or cloud cover and casting non-uniform shadows).

There's no doubt Unity is a professional bundle, but it's not foolproof. The game development arena is a lot more mature on Windows than Mac and lot of middleware products designed with Windows in mind won't play with Unity, so you don't have the wide range of time saving tools or applications to support your creation. You have Unity, and whatever else you can find from a much smaller application pool. There's another caveat that revolves around updating games made with Unity. It's not an open source project, so you'll be relying on Unity technologies to release patches for you, unless you fork out for a full license with source code included.

**Where to get it:** [www.unity3d.com](http://www.unity3d.com)

**Suitable for:** OSX users with a wet spot for 3D game creation.



## XNA Game Studio Express

So, we've discussed a couple of fairly robust engines aimed at different spectrums of the game making world – but what if you want total control while still enjoying the support net that won't come from coding C from scratch. That's where XNA comes in, or more specifically, XNA Game Studio Express. XNA is a relative newcomer to the world of game-making, a set of libraries created by Microsoft for the .NET framework and focused on game creation.

It's not for the faint hearted, and if you're liable to get a brain aneurysm using Game Maker, you need not apply here. Coding experience or a willingness to learn C# is a must, as there's no cutesy drag-and-drop interface to hide behind. XNA Game Studio Express is freeware for hobbyists, indie developers and amateurs to begin making games at the code level, which, of course, gives total creative control. Where something like Game Maker will restrict the user

by virtue of hiding lower layers of application design, XNA will let you do as you will, provided you've got the knowledge.

Game Studio Express is basically a collection of 'starter' kits, projects you can open in Visual C# studio Express that'll show you the basics of creating anything from an FPS to an RTS, and from there you can take advantage of a bucket load of Microsoft and community tutorials to work your way up to something original. You've got to put in the hard yards in learning the language (in this case, C#) and be totally prepared for your first efforts to have trouble rivalling Pong for ingenuity, but dedication will pay off. Think of XNA Game Studio Express as an extension of the Visual C# Studio development environment, so if you've got experience with any version of Visual Studio, you're ahead of the curve.

One of the huge selling points of using XNA comes from the ability to distribute your games on Windows and Xbox 360, allowing you to spread your wares amongst a large market. While distributing Windows titles is free, to push out games on the Xbox 360 requires an annual fee to gain entrance to the 'Creators Club'. While you should be frugal at the beginning of your game making journey, being a part of the Creators Club allows you to compile your game for the Xbox and share them with other Creators Club members. It's a neat way to get goods delivered straight to the fiery consoles of eager gamers.

Microsoft is obviously pushing XNA hard; at the recent Game Developers Conference in San Francisco the software giant announced intentions to integrate its Zune mobile device as another endpoint for XNA content, meaning you can create the next big title for PC, Xbox 360 and the supposed iPhone killer all at the same time.

### Where to get it:

<http://creators.xna.com/Resources/Essentials.aspx>

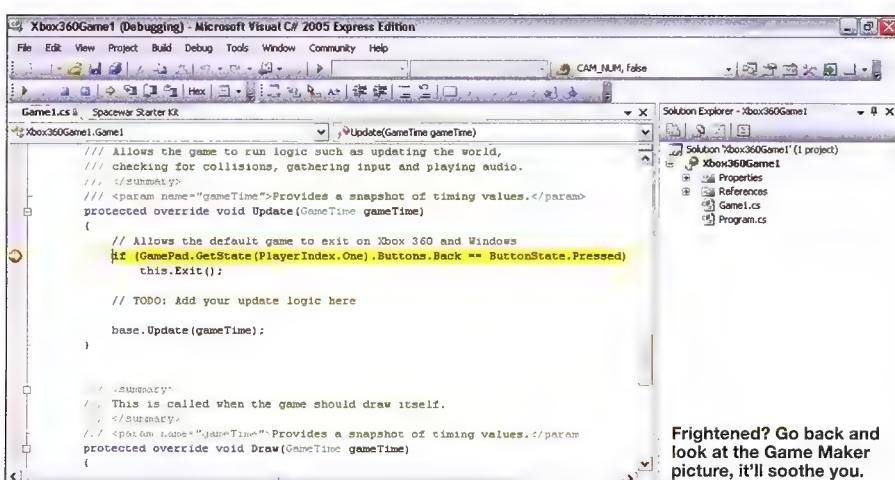
**Suitable for:** Serious developers.



## Torque

If the name 'Torque' sounds familiar, it's because it was the 3D engine behind FPS *Tribes 2*, and since then has been made available as an end-to-end development solution for game creation.

It's probably one of the most popular kits out there, and with good reason. It's cheap – there are versions of Torque you can license for a mere \$US100 – and you can actually start spitting out reasonably high quality games in a short time. Garage Games has a 'something for everyone' line-up of software with separate products for 2D and 3D development work. First up is Torque Game Builder (TGB), dedicated to producing 2D games similar in style to Game Maker, but with a far richer feature set. Everything from object behaviours to AI pathing can be controlled via the GUI and your game compiled within seconds for a test run.



# PRO ADVICE

“Get your stuff shown and be persistent. The internet, modding scene, anything you can to get your stuff out there and noticed. Don't let anyone dishearten you. Stick at it. I think individuals and companies are quick to criticise, but don't be put off. You need to have a thick skin to work in this industry, but your persistence will pay off. Have fun; this is a business but it's also a great, fun industry.”

**TONY PARKES,  
HEAD OF TRANSMISSION GAMES STUDIO**



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## PRO ADVICE

“**You've got to network. You've got to get to every conference and seminar you can and talk to people. Sure; you've got to be talented as well – work on your own projects in your spare time or build your portfolio – but if you don't network, that's all you'll be doing. Knowing someone in the games industry, that you've had a chat or a drink with at an event, is almost as good as a foot in the door.**”

**ANDREW GOULDING, ASSISTANT PRODUCER, KROME STUDIOS**



**Orbz** – made with the Torque suite – is a nifty, addictive little game.

that builds on the success of other Torque products while being written entirely in C# and allows seamless integration with XNA Game Studio Express. Tasty.

Torque has a massive community behind it and it's probably the best overall choice from the engines listed here.

#### Where to get it:

<http://www.garagegames.com/products/browse>

**Suitable for:** Something for everyone.

## Mod Shop

You don't have to invest in an entire engine to let loose the first few sparks of creativity; look around that shelf of PC games next to you, and you'll find built-in tools for modifying game engines. *Unreal 3* for instance, has an absolutely gob-smacking level editor that'll provide hours of fun as you tinker with the standard maps and design your own. Beyond that you can download *UnrealScript* and begin the journey of modifying the core gameplay and behaviours in *UT3*, creating something original while only having paid the cost of the game itself. Break it out, and have a play – Modding is a cheap way to get started, and industry folk like Tony Parkes of Transmission Games are always keeping an eye out for talent,

“I think it has had a tremendous, lasting impact” commented Tony when we asked about the effect of modding on the games industry. “I love that fresh new talent gets to show off their creative ability without needing to write their own rendering engine. I've personally hired numerous designers and mission builders from the 'scene'.”

digital distribution isn't something that's going to happen early on, so getting your work out there via free methods is the only viable solution; besides... your first few games will probably stink, so do you really want anything but a polished product out there on Steam with your name attached to it? Investigate online portals like [www.trygames.com](http://www.trygames.com) or [www.newgrounds.com](http://www.newgrounds.com) to get your stuff hosted and played but bear in mind your game will be nestled amongst titles that range in quality from *Supreme Commander* to titles with storylines like “Jill is back in an all new out-of-this-world adventure! In *Cake Mania 2*, it's up to you to choose which path Jill takes.” If that doesn't scream pedigree, we don't know what does.

Finally, make sure if you're going to host games via an online portal there's a space for user comments. Feedback – though it can be a kick in the guts – is invaluable, and if you don't listen to what the players like or dislike about your game, then who are you making it for?

## Onwards and upwards

There's only so long that someone who finds a passion for making games, be it in a design, development or architecture capacity, is going to be satisfied with the smaller scale amateur scene. What if you want to go pro? Apart from the obvious avenues of tertiary education, you could do a lot worse than bookmark [www.sumea.com.au](http://www.sumea.com.au). Sumea is the rapidly beating heart of Australian games development, and lists not only every developer in the country, but every industry job that's out there as well as news, articles and general industry buzz from the Aussie scene. It's the place to be if you want to expose yourself to the game making world – even before you have

## Planting the seed

So you've built it. The game to stand on the shoulders of all other games, look down on them, and laugh maniacally. It's got *Crysis* graphics, *Bioshock* atmosphere and *Wii tennis* playability, but how do you get it noticed? Where do you put your game so that others can enjoy it and you can make a name for yourself? The obvious starting point – and a success story for many indie start-ups – is online distribution. If you're leaning towards XNA, then utilise something like the 'Creators Club' to share your work around on massively popular platforms like Xbox; if you're creating small titles in Game Maker, use YoYo games' inbuilt upload feature on the site to publish your title for all to see. Even if these options aren't available, make a website, offer a demo and give the masses a taste of what you've got to offer.

Securing sales via retail outlets, or 'Steam'

## THE EDUCATION PERSPECTIVE

**Tertiary study in game development is a tactical nuke in the arsenal of those wanting to break into the industry, so we took some time out to speak with Aaron Styles, recent graduate of an Advanced Diploma in Multimedia at Victoria University.**

**atomic** What's involved in the course you've just completed?

**Aaron:** It's a two-year course, covering everything you need to know in order to make games. Coding, 3D Art (characters and environments) level design, sound and project management. It also covers the more philosophical stuff like 'what makes games good' and 'getting into the industry'.

**atomic** What were you looking for, as the end result, from a course like this?

**Aaron:** Getting a job in the industry as a junior level designer. I've got a preference for working somewhere like IR Gurus, as they're using the Unreal Engine 3 for their next project, and I love its editor.

**atomic** What sort of software do you get exposed to in the course?

**Aaron:** 3DS Max 8, Photoshop, Visual Studio

2005 (C#), Flash, Unreal Editor, Cubase and a few others.

**atomic** What sort of background would be good to have before approaching a degree like this?

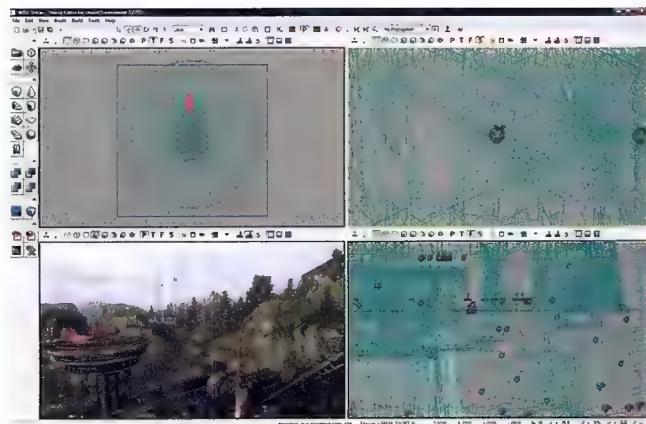
**Aaron:** The learning curve for the course is pretty shallow, so there isn't any specific knowledge you really need.

**atomic** Have you got any completed projects – games that you've finished?

**Aaron:** Yes, I've completed about ten projects over two years.

**atomic** Finally, any recommendations for amateur game developers? Words of advice?

**Aaron:** I'd recommend they just do it. Finish reading this article then start making something – either a level for an existing game, or a small title using something like Game Maker. The best way to learn is to do.



any software to offer – and become immersed in everything that's going on, from development to business trends.

There are sponsor jobs to keep an eye out for, and an active forum for discussion about game audio, art, modelling and programming. Not having Sumea on some kind of auto refresh in your browser window is damaging to the mental health of any intrepid amateur game maker.

As far as job hunting goes, if you're ready to make professional inroads there's the usual scouring of jobs and networking within the industry, but there's also some nifty ways to implant yourself into the games industry via roles like QA/testing.

"QA is an opportunity to get up close and personal with the people you want to work with," says Andrew Goulding, news editor of Sumea. "It's traditionally been the stepping stone for many people into the industry due to the fact you don't need any formal qualifications except a passion for games."

So, you're now armed with the tools, the direction and advice to get started. All you need, of course, is the game itself. If you've ever had an idea – something smashing and original – there's never been a better time to get started. With a smorgasbord of great engines and middleware to leverage, an industry hungry for talent and a new paradigm from big fish, such as Microsoft, who are pushing new applications and distribution methods to enable people to get started quickly, the excuses are drying up fast. So put the magazine down, and get cracking on the Game of the Year – we'll be waiting. 

## PRO ADVICE

**“**If you're starting out it's important to take on small projects. Don't attempt a huge game your first time, it'll take you years. You learn a lot more by picking something simple and trying to finish it in a few months. Start out with a basic shooter, puzzle or platform game. Posting your work on forums is also an excellent way to get feedback and tips – don't be secretive about what you're doing, put it out there and don't be afraid of the feedback. 

**CONOR O'KANE, ARTIST, TANTALUS STUDIOS**

**atomic**

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# HACKING IN THE REAL WORLD

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atomic

**Daniel Rutter looks into some popular hacks and discovers it's not all cyberpunks and code-warriors. Here's the real deal on net security...**

**H**ack' is an overloaded word. A hack can be a quick and clever piece of programming, or it can be a dumb and clumsy one. It can be a cunning way of making a device, technology or whole area of human endeavour better, or it can be the heart of a scam that steals from millions of people. 'White hat' hackers have been trying for decades to get people to call the bad kind of hacking 'cracking', or at least something other than just 'hacking'. But that battle's been lost. Hackers in the popular media today will usually be stealing credit card numbers, or (allegedly) scheming to destroy the Western world.

Authoritarian fantasies, lousy reporting and terrible movies aside, all real hacks, good and bad, have a long and fascinating history. Hacks in the context of computation go back as far as computation itself,

which is much, much longer than the history of the electronic, or even the mechanical, computer.

When Diebold's web site offered qualified buyers the chance to buy spare keys for their AccuVote-TS voting machines, for instance, the listing included a detailed picture of the actual keys.

Ross Kinard of [SploitCast.com](http://SploitCast.com) was, I imagine, rather pleased with himself when he thought of grinding blank keys to match that picture. And yes, it turned out that all of the keys were the same.

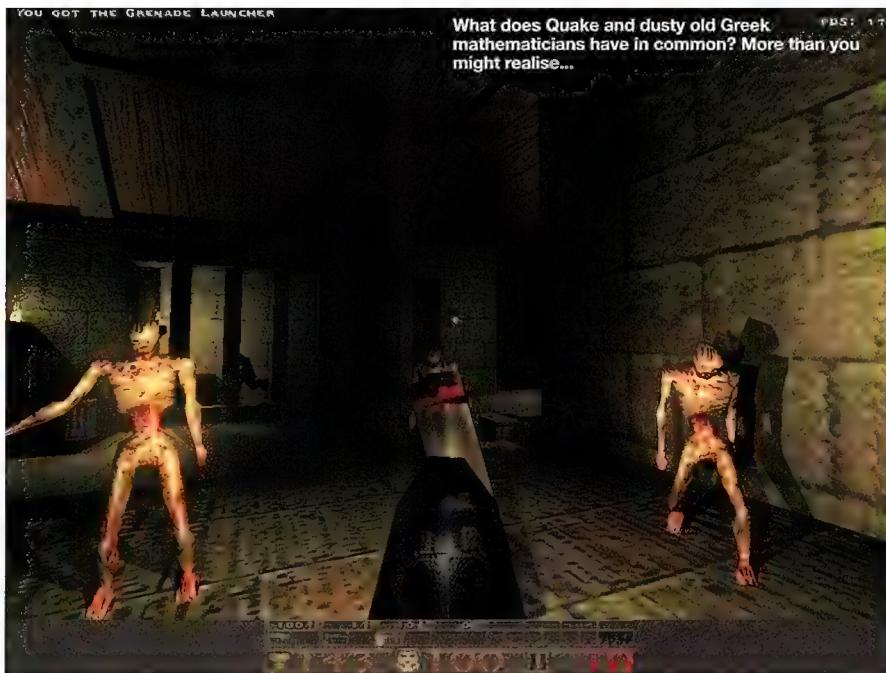
The details of this story are very modern, but devious key duplication is, of course, about as old as locks. Which is to say, about six thousand years.

A large part of the history of hacking is repetitive, because the same old tricks can keep working over and over when people trying to secure a system – a computer, an office, an election – don't try hard enough.

In the computer hacking world, there's not much interest to be found in the millionth web site that doesn't stop people from typing in SQL commands as their username, or the millionth program with a buffer overflow vulnerability, or the millionth company that puts a file full of plaintext passwords on an open server that Google then cheerfully indexes for them.

If you discover that some dumb web site will treat you as having an account if you just append 'loggedin' to a URL, congratulations, now you're a hacker. But only about as much of a one as someone who can jog around the block is an athlete.

So never mind the boring stuff. Herein, I have chosen a few recent hacks that made big news – in certain circles, at least – all of which are new, but all of which also have their own, often lengthy, history.



## /\* This code copyright Euclid, 300 BC \*/

3D computer games use Pythagorean geometry to figure out distances. This makes it important that they have a very fast way to calculate inverse square roots – or, at least, approximate inverse square roots, close enough to keep the dungeon walls flat and connected to the floor.

So there was some excitement when John Carmack came up with just such a super-fast inverse root function, in the original *Quake*.

You can read more about it at [tinyurl.com/2ykza9](http://tinyurl.com/2ykza9), but the take-home message is that Carmack's approximation technique had just a teeny bit of history behind it. It was an ingenious addition to 'Newton's method', discovered not by Helmut Newton or on an Apple Newton but by Isaac Newton, in the late seventeenth century.

This isn't exactly the sort of breaking-into-the-Pentagon hack you might have expected me to start with, but I think it underlines the depth of history we're talking about here. We're used to regarding eight-inch floppies as if they roughly coincided with the Mycenaean Empire, but the history of hacking is really the history of human cleverness, and that goes back much, much further.

## Bulletproof anonymity. According to some dude.

In 2007, Swedish security consultant Dan Egerstad kindly set up some 'exit nodes' for the Tor anonymity network. Tor is a distributed 'onion routing' system, through which the path of data is very difficult to track. For all intents and purposes, nobody can tell where data coming out of a Tor exit node entered the network, or what a person connected to an entry node is doing.

So Tor's a great way for people in repressive countries to do stuff on the web that their

data passing through a computer you own is not, if you ask me, actually much of a hack. But the boringness of the hack is more than made up for by the lesson it teaches – don't use an interceptable, unscrambled communications medium to transfer confidential data.

Data *inside* the Tor network is highly secure, but if it's coming from and going to computers *outside* the network, then it's as wide open as any other plain internet connection.

People put confidential data in accessible plaintext all the time. You've probably done it several times. Do you, for instance, shred your ten-year-old bank statements when you throw them away? If you don't, and if that account is still open, anybody who gets hold of the statement can use the information on it to help them steal your identity, or just make fake cheques.

And shops just *won't* stop throwing away unshredded credit card carbons. That's why credit cards have all sprouted those little Card Security Code numbers, usually on the back of the card; there was no other way to stop dumpster divers from collecting valid card details. Online stores that don't ask for a Card Security Code will still accept such stolen details.

Oh, and have you ever put confidential information in a plain email? Admin staff at your ISP can, but probably won't, read any mail you send through their servers. Every internet relay point for traffic from your ISP's server to the recipient's server – that'll probably be at least two or three companies on top of the ones that own the sending and receiving servers – can also trivially sniff unencrypted SMTP email. And then there's whoever runs the receiving mail server.

## The single greatest weakness

"Good afternoon, Mr Bloggs. My name's Steve, and I'm calling from Visa International. Have you made any large credit card purchases in Estonia lately?"



No? Well, no problem, we'll clear that right up for you. I've got your card number here – it's 3141 5926 54- it isn't? Oh, sorry – could you just read it off for me...?".

OK, maybe the above script wouldn't work on you. But you'd better believe it'll work on *someone*. Steve'll be buying a dozen iPods using someone else's Visa details before the day is out.

Calling someone on the phone and persuading them to tell you their financial information, email password, alarm code or what-have-you is one of those boring hacks that work over and over again. Phone scams, like posting people fake traffic tickets or bills for things they never bought, are really just confidence tricks, not hacks as such. But confidence tricks are all forms of 'social engineering', a category into which an amazing number of hacks fall.

Technological social engineering hacks tend to involve laying some sort of con-job trap. Phishing, for instance, is immensely popular – and tricking people into entering login details on a fake web page that looks as if it belongs to their bank, or whoever, is classic social engineering.

Phishing traces its lineage back to door-to-door impostors and fake institutions of all kinds. Some of those scams don't work any more – the fake betting shop depicted in *The Sting* wouldn't work with today's ubiquitous instant communications, and 'bucket shops', brokerage firms that deal with customers but don't bother to actually buy or sell any real securities on their behalf, also died out long ago.

But other fake institutions are still around today. All of the best Nigerian advance fee scammers have a fake bank at their disposal, for instance.

"The Amalgamated Blue Chip Commercial Bank of My Dad's Garage will be very pleased to offer you a secure escrow service, to make perfectly sure that the advance fee you're sending does not vanish before your seventy million dollars are delivered!"

The most elegant social engineering hacks involve almost no lying at all.

Suppose, for instance, that you'd like to get people inside a given business to run some sort of Trojan or other, so you can access their network or otherwise steal their secrets.

Why go to all the trouble of 'real' hacking, trying to find externally accessible vulnerabilities in what may be a very well-secured company network, when random employees will be perfectly happy to run your software for free?

Just gather some cheap USB flash drives (or CD-ROMs, but USB drives are more attractive), write something tempting on them, and set them up to auto-run your software using U3 or something similar ([tinyurl.com/ytv7ns](http://tinyurl.com/ytv7ns)). Or just put the software's installer on the drive and call it 'hotstockpicks.exe' or 'amazinglesbian.exe' or something.

Now, leave those drives lying around in the target company's parking lot. Or in a *public* parking lot, if you don't care whose internet banking login you steal.

to actually do), or by creating systems that use authentication methods – like fingerprint readers – which users cannot give away to an attacker, no matter how much they want to.

Even if you make huge investments in cryptographic key fobs and iris readers and DNA analysers, though, you still have to make sure that every link in your security chain is just as strong. The continuing prosperity of TV evangelists suggests that now, as for the last hundred thousand years or so, you may have a lot of trouble fixing those last few weaknesses.

to send specific information to them via one or another seldom-firewalled avenue, but there are plenty of off-the-shelf options

This method of attack seldom makes the headlines, but it's about as old as floppy disks – though it really only came into its own when offices started being networked and internet-connected as a matter of course.

There's no way to foil social engineering attacks in general. You can stop them in particular situations by educating your users (which is conceptually simple but often extremely difficult

“ Phishing traces its lineage back to door-to-door impostors and fake institutions of all kinds.





## Cryopreservation – it's not just for human heads!

Your work PC's whole hard drive is encrypted. Every time you start your computer you type a separate decryption password to access the drive. Without it, everything but some early-boot system files might as well be random noise.

One day someone walks into your office while you're at lunch and your computer is in standby. He removes the side panel from your PC, and turns the computer off while spraying the RAM modules with an upside-down can of 'air duster', which has a boiling point of about -25°C. Then he removes the hard drive, and the frosty memory modules, from the PC. He wraps the RAM with newspaper and puts it in his pocket. He replaces both the RAM and the drive with identical units, replaces the side of the computer, turns it back on, and departs. Elapsed time: maybe two minutes.

When you come back, you'll have a mysteriously blank hard drive. But that's all the evidence there'll be if nobody checks serial numbers on the drive and RAM. Nobody's very likely to do that, because everyone knows the drive was encrypted. Even if some James Bond stuff *did* happen while you were at lunch, it's not as if the stolen drive could possibly be of any use to anyone.

Down in the parking lot, the attacker slots the still-chilly memory modules, which at low temperatures can preserve their contents for several minutes, into a computer powered from his car battery via an inverter.

That computer boots a bare-bones OS that dumps the RAM contents to a file.

At his leisure, the attacker can now scan the dump file for the distinctive numeric fingerprints of a variety of different encryption keys.

(He could have done the same thing quite quickly by just booting a thumb drive set up to do the same thing on your computer. But let's say he didn't have the time. Or just loves feeling like a secret agent.)

If and when the attacker finds your encryption key – and even if RAM data decay has caused a small percentage of the key to be lost, rebuilding the rest can be the work of minutes, versus uncountable zillions of years to brute-force the whole key – he can now decrypt your drive.

If you're concerned about this, by the way, you can just turn your computer off or put it in hibernate mode when you're away. That'll power down the RAM, which will lose all of its contents within a minute or two at most. Probably only a few seconds, at normal PC interior temperatures.

Usually, attacks that require physical access to the target computer aren't very interesting, but this one's a classic hack. That's partly because it defeats technology specifically created to protect against attacks by people with physical access, and also because it's a real-world scenario and thus includes multiple elements.

The core of it is a kind of hardware hack, based around the surprisingly long 'data remanence' of dynamic RAM. Memory may need to be refreshed millions of times a second while the computer's running, but it turns out that it does actually retain its contents for quite a long time when it's powered down, especially at low temperatures. And powering it back up again doesn't erase that data.

But there's more to this attack than that. The

attacker has to get access to your computer, which probably involves some social engineering to get him or her into your office. And finding the encryption key (or other desirable data) in the RAM dump requires a bit of software ingenuity.

For more information on this sort of attack,

computer based on anything resembling current computer science will ever be able to do the job.

Between these extremes are hacks that someone figured out were possible years, or decades, or centuries ago – but only with far more computational power than existed at the time.

## “Rainbow tables are one of those things that people have known about for approximately forever...



including the finding and repair of keys, check out the web site of the nine researchers at Princeton's Center For Information Technology Policy who discovered it: [citp.princeton.edu/memory](http://citp.princeton.edu/memory).

### The eavesdropper at the end of the rainbow

Some algorithms – say, the Luhn formula that verifies the basic integrity of credit card numbers – are computationally so trivial that you can do them with a pencil and a small piece of paper.

Others – like brute-force cracking of the better forms of cryptography – are so computationally intensive that we can say with confidence that no

And now, that computational power does exist. ‘Rainbow tables’ are a great example of this. A rainbow table is a lookup table for reversing hash algorithms.

Hashing is a standard technique used to, for instance, secure passwords. No sane software stores user passwords to disk in plaintext; instead, it uses a hashing algorithm to turn each password into a string of pseudo-random data, which is computationally extremely difficult to turn back into a password. When you type your password in, the system hashes it, and checks it against the stored hash. Storing or transmitting the hashes themselves is quite secure, so many systems do.

One of those systems is the GSM digital mobile

phone standard, used all over the world, including Australia. One of the big selling points for GSM was that it was encrypted and secure. You could listen to conversations on the old analogue phones with a radio scanner, but GSM eavesdropping was impossible. Until now.

A rainbow table is a big list of possible inputs – passwords, encryption keys, whatever – and their corresponding hashes. If a given hash is present in the rainbow table, you can look up the corresponding original string.

To make a rainbow table you need to grind through the hashing algorithm for every string you want to be able to reverse. This requires lots of processing power, and the final table is likely to be very large.

Rainbow tables for many serious cryptographic algorithms would require more bits of storage than there are particles in the universe, but some algorithms, including the A5 algorithms used by GSM phones, are much more attackable. With custom Field-Programmable Gate Array (FPGA) computers and a few terabytes of storage, a rainbow table for even the more secure A5/1 algorithm (Australia only uses the far less secure A5/2) can be yours: [wiki.thc.org/cracking\\_a5](http://wiki.thc.org/cracking_a5).

That's *slightly* out of the price range of home users at the moment, but not by much. Rainbow tables are one of those things that people have known about approximately forever, but for most of that time have regarded as obviously impossible. Like flying machines.

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## Dick-pill supercomputers

In early 2008, in a development which strangely did not attract the attention of the TOP500 supercomputer list, a new distributed computing network became the biggest in the world.

We feel fairly confident in saying that the reason why that network didn't make it into the list along with BlueGene/L and Red Storm Sandia/Cray is because it exists primarily to send penis-pill spam.

The new network was colloquially referred to as Mega D, after one of the pills that its principal users used to sell. Mega D surpassed the Storm botnet – also used for pretty much nothing but spamming, and in the next couple of months, it in turn was beaten, by the Rustock and Srizbi botnets ([tinyurl.com/2q4qaj](http://tinyurl.com/2q4qaj)). By the time you read this there'll probably be yet another top 'net.

What won't have changed much will be the proportion of the world's spam – now more than a hundred billion messages a day – sent by just the top few botnets. That's well over half, and maybe as much as 85 per cent of total message traffic.

All of these botnets are composed of hordes of Trojan-infected PCs, some of which may be members of numerous botnets, large and small. And the supercomputer comparison is facetious, because botnets generally don't actually use much of the vast processing power available to them.

Instead, the major botnets have thus far used their millions of nodes to send spam, and to

“ All of these botnets are composed of hordes of Trojan-infected PCs... ”

host spammy web sites – fake pharmaceuticals, fake 'discount' software, fake watches, even fake *marijuana* – and the nameservers for those sites. There've also been occasional ventures into Distributed Denial of Service attacks, and of course the sending of email with more copies of the relevant Trojans attached.

Botnet operators also use their zombie slaves to 'click' on web ads, or install spyware and/or adware. Watch this space, though; I'm pretty sure bot-herders have only scratched the surface of what you can do with 25 million computers about whose owners you do not care.

The history of the botnet has two branches. Viruses on one side, worms on the other.

There's little conceptual difference between a botnet client that installs itself when some gimboid runs that amazing new 53-kilobyte version of BioShock he just downloaded (and yes, that's social engineering again), and the elegant old floppy boot-sector viruses. This has been a real case of newer species displacing older ones; plain old-fashioned viruses are very thin on the ground

these days, but botnets, spyware, adware and other malware are an epidemic, as anybody who's been asked why Great-Uncle Bert's computer now takes 37 minutes to boot will know.

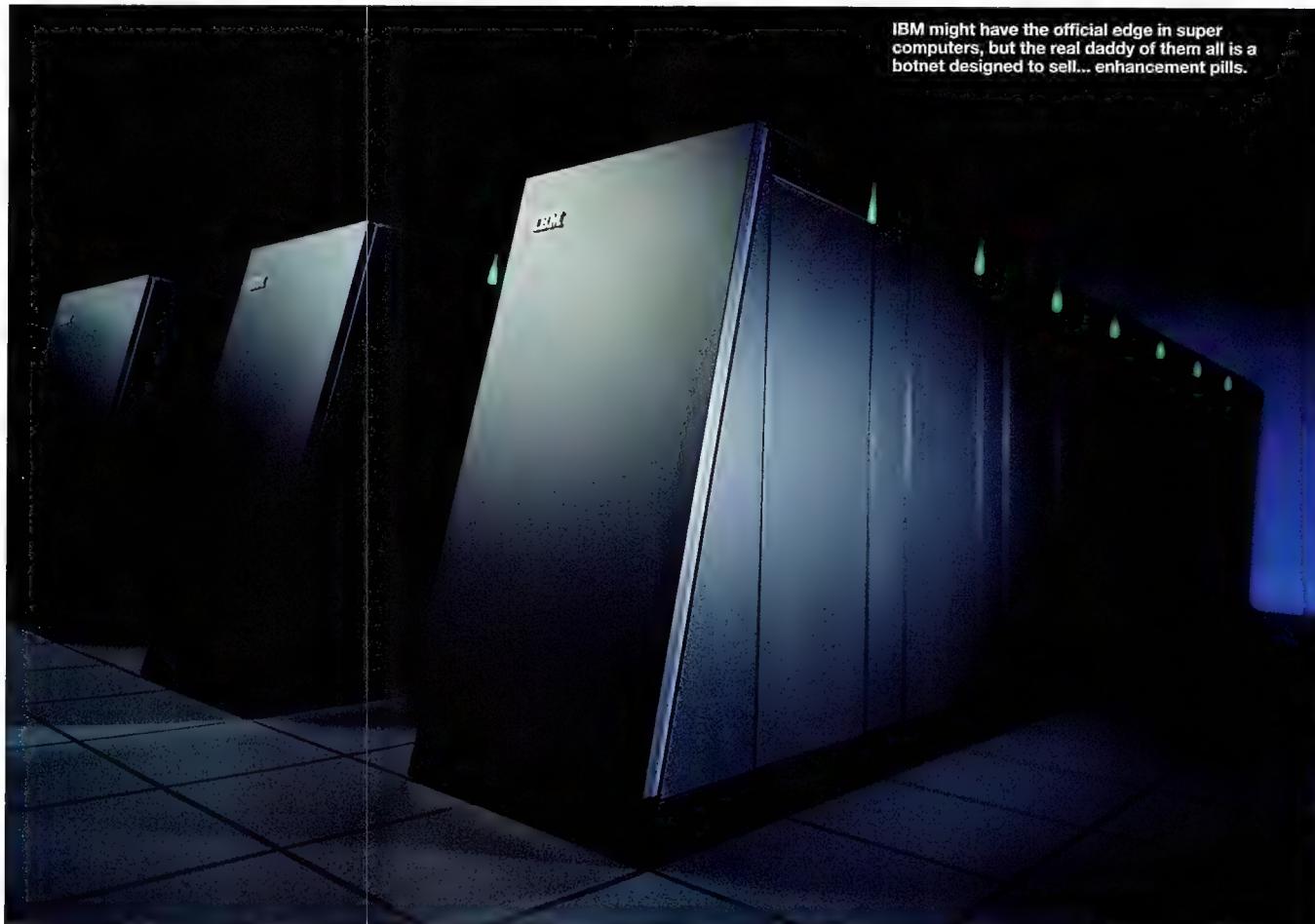
On the other side of the botnet family, you've got internet worms that hark back to the original 'Morris worm' of 1988. That one was actually only intended to figure out the approximate size of the Internet, but Robert Tappan Morris, then a Cornell student, made the mistake of allowing the program to infect one computer multiple times. Infected systems rapidly bogged down into uselessness.

Curiously, the very first practical network worm was, like the botnet Trojans, intended to create a distributed network. It was written in 1978 by two Xerox PARC researchers, and it propagated across the local PARC network, looking for idle PCs that could be given something useful to do.

1978 was also, coincidentally, the year of the very first email spam, an invitation to a DEC product presentation.

There really is nothing new under the sun.

IBM might have the official edge in super computers, but the real daddy of them all is a botnet designed to sell... enhancement pills.



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# Introducing THE QUAD CORE GAMING BEAST

## Quality Assured

Our technicians are constantly adopting the latest technology in our pursuit for gaming performance. Our featured product this month is an overclocked gaming system based around the Intel Q6600 Quad Core CPU, Abit IP35 Pro motherboard and Chaintech Apogee 1066MHz Memory. With three soon to be released gaming engines all sporting multithread support, quad core CPUs are set to take over the performance crown in the gaming arena.

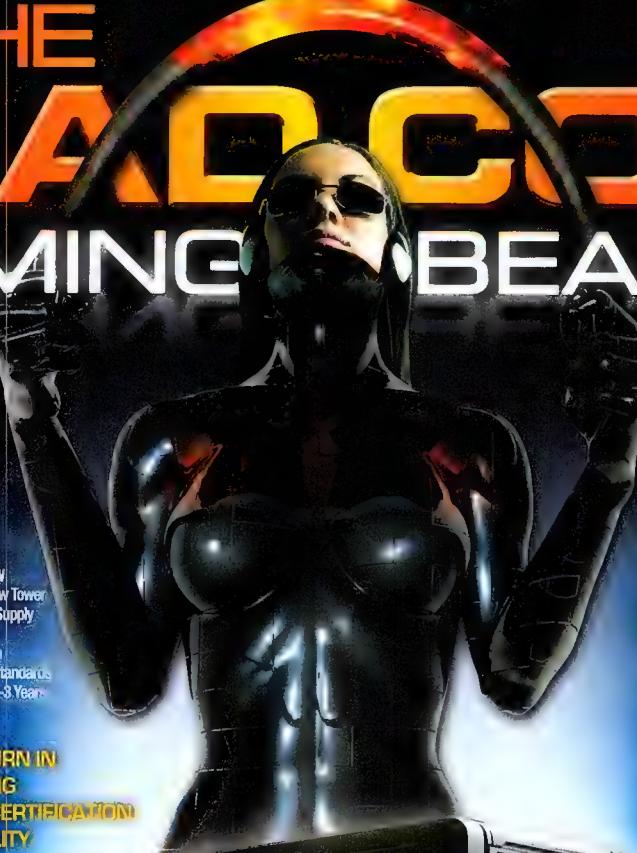
## Specifications

- Intel Q6600 2.4GHz Quad Core
- Thermalright Ultra 120 eXtreme
- Antec 120mm Tri Cool
- Abit IP-35 Pro Motherboard
- 2GB Apogee DDR1066MHz Memory
- 8800GTX 768MB DDR3 PCI-E Graphics Card
- 500GB WD SATA-2 HDD
- 18x Pioneer SATA DVD+/-RW
- Grill Front High Flow Window Tower
- Ultrix 600Watt True Power Supply
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- Crank up the eye candy and watch the frames fly!



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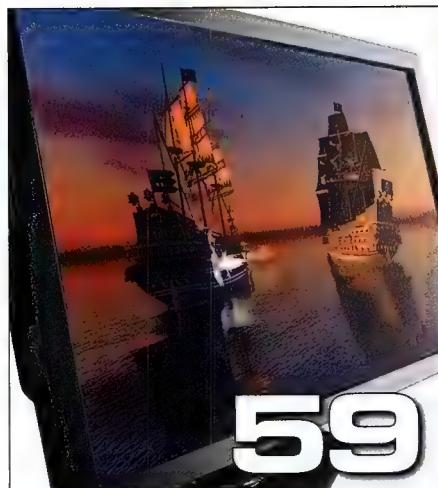
# HARDCORE

NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

It's a bumper crop of next gen technology this month, as Josh Collins busts out his testing tools and benching... something beginning with 'b'.

We've got brand spanking new 790i motherboards, X48 motherboards, and even a look at NVIDIA's latest ESA technology, which is a pretty neat piece of engineering and will be a real boon to system tweakers and PC enthusiasts.

So you've got something to plug into that brand new board, we're also looking at a whole mess of new 8- and 9-series cards from NVIDIA, some tasty new DDR3 RAM, and Dell's newest big screen monitor. Did we mention the drooling? No? Well, there was a lot of drooling in the labs this month.



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We have five funky AVLabs My Tube iPod speaker systems to giveaway, each worth \$199. If you want to pump out some block rockin' beats (or, really, any other kind of tunes), there's only one place to go.

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# GEARBOX

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and gear!



## ► Enermax Aurora Premium keyboard

Price \$99 Website [www.enermax.com.tw/](http://www.enermax.com.tw/)

The keyboard is an easy to overlook, yet essential peripheral for all computing endeavours. You might be able to get away with crappy RAM and on board graphics if you really need to, but you'll actually be using your keyboard day in, day out. If it sucks, so does your overall computing experience.

This heavy duty aluminium fascia-ed keyboard from Enermax does not, in fact suck. It's solid enough to put up with even the most maniacal of WASDing or MMO key-bashing, features a heavy yet solid keystroke action, and the brushed aluminium finish is pleasing to the touch and looks good to boot. What's more, it's feature-packed – adjustable feet with three height levels, extended wrist rest, audio I/O with onboard soundchip and two USB 2.0 ports for some hot daisy-chaining action. It also comes in black and silver models, so you'll have no trouble matching it to your existing hardware.

## Belkin Concealed Surge Protector ►

Price \$99 Website [www.belkin.com/au](http://www.belkin.com/au)

Belkin excels at providing the kind of essential products that you don't even realise you cannot live without until you start using them. The kind of product that can easily save you from, say, losing your net connection during a particularly hot *Frontlines* session because your cat has knocked the power cord for your modem, causing it to reset.

Not that we're bitter.

At least, not much, certainly not now we've got the Belkin Concealed Surge Protector on the case. It features six protected power blocks with recessed sockets, cable runs to keep everything neat and tidy, and a closing door that makes sure that no bums (or cats) can meddle with the flow of power to your vital electronics. The closing door locks, too, so that smaller hands cannot pry at it, and it even features coax cable and telephone ports.



## Guinness World Records Gamer's Edition 2008 ►

Price \$35 Website [www.gwrgamersedition.com](http://www.gwrgamersedition.com)

Everybody loves pointless facts. If you're reading Atomic, you probably love gaming in some form. Like combining two great flavours (ah, Nuts and Gum, together at last...) the obsessive folks at Guinness have just released the inaugural Guinness World Records Gamer's Edition.

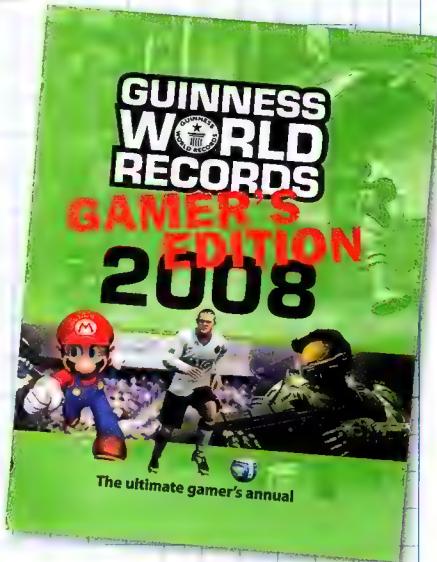
If you've ever wanted to know what world firsts your favourite game might have garnered to its name, this book will tell you. Did you know that *Donkey Kong* was the first example of visual storytelling in a game? You do now. And if you just love games trivia, the book's a goldmine. For instance, did you know that Iain M Banks' recent novel, *Matter*, was the first time the writer ever missed a deadline, because Banks was addicted to *Civilization* at the time? See, it's great stuff, and there's over 250 pages of similar trivia, high scores, facts and interviews.



PLASMA PISTOL



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## ► Halo 3 Laser Pursuit Plasma Weapons

Price from \$US79.99 Website [www.jasmantoy.com](http://www.jasmantoy.com)

Can there be any greater joy than stalking a loved one and raining hot plasma death upon them as you cackle in victorious glee? If there is, we don't want to know, because the very pinnacle of laser tag technology has to be these life-size replica weapons from *Halo 3*.

Sure, they're not standard UNSC issue, but there's a certain alien elegance to these high tech tools of war. And when we say life size, we mean Covenant size – they're actually quite large, and feel very heavy in the hand, just like the real things would. Quite apart from being a cool laser tag set, they even have proper working parts and fire modes; the Plasma Rifle, for instance, can rapid fire, but fire 20 shots and it freezes, cooling vents pop open, and it shakes about in your hand! Too cool for mere words.

## MuVo T200 MP3 player ➤

Price \$149.95 Website [www.au.creative.com](http://www.au.creative.com)

One of the fiddliest things we always find with MP3 players is getting them connected to your computers. Between your work machine, one or two home machines, and even your friend's PCs, there's a lot of places you might want to be sourcing music from, but not necessarily carrying around cables and the appropriate software just in case you want to engage in a bit of consensual music leaching.

The MuVo T200 gets around that by essentially mating an MP3 player with a USB memory stick. When you look at the little thing, you've got to wonder why no one else has thought of this before. It features 4GB of memory for music and other files, a colour LCD display for track navigation and display and 32 preset FM radio stations. It even features a voice record function, for taking down those essential ideas that come to you on the train, but that you know you'll forget the minute that cute redhead that just got on sits next to you.

It can happen!



## ◀ Edifier e3550 Lifestyle speakers

Price TBC Website [www.edifier-international.com](http://www.edifier-international.com)

Sound is another facet of computing that is pretty much a given essential these days – whether you prefer good head phones, an elegant 2.1 setup, or the full surround experience with more speakers and wiring than a rock concert. But just because it's essential doesn't mean you should put up with crappy design.

The Edifier e3550 speakers look as good as they sound – in an era where form is increasingly becoming as important as function, that's a handy thing. On the sound front, this 2.1 set up is excellent for just about any PC use. Music is crisp, warm and clear, while the kind of rich sounds that most modern games deliver, from roaring crowds in sports titles to the rumble of action explosions, are delivered with plenty of bass and rumble. The black, cone-like design would compliment any stylish case and monitor combo, and red LEDs finish off the subwoofer and control unit.

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### Asus A7SV Notebook

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# XFX 790i Ultra SLI

The 790i has finally hit and Josh Collins is ready and waiting.

## SPECs

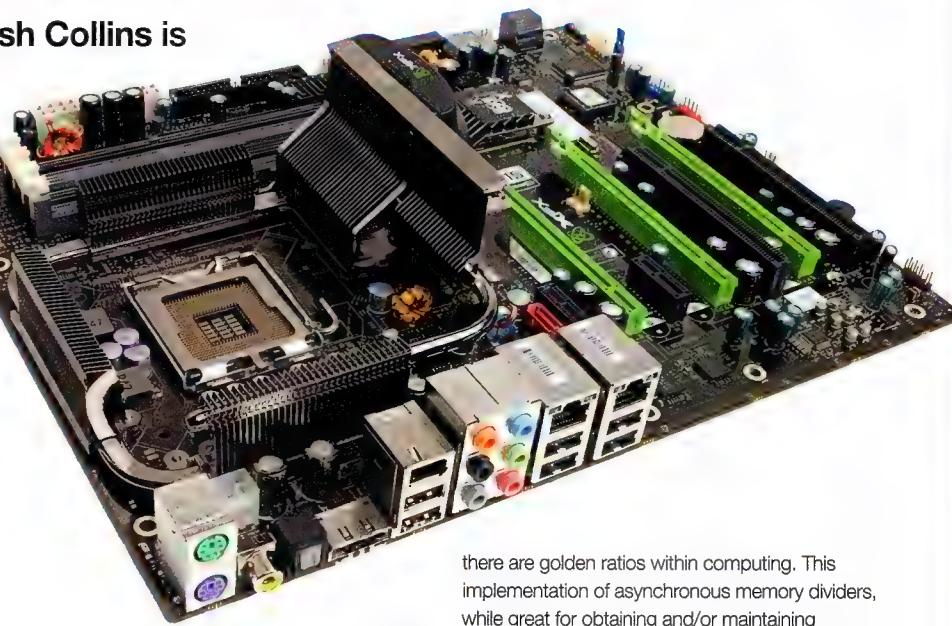
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 DDR3-2000; 1x eSATA; 6x USB 2.0 on rear I/O; 2x gigabit LAN

Last month we took a look at the recently released 780i SLI motherboard from NVIDIA, in the form of the reference design board branded by XFX. This month we're taking a gander at the 790i Ultra SLI, the 780i SLI's older brother.

Those of you who read the memory Head2Head will remember that there were issues with maintaining consistency such as FSB frequency, divider ratio used and the multiplier influencing the final CPU frequency. As a result the memory roundup was a snap shot of the market at that time and reflected what it has been for the past six months.

This month we can finally wave goodbye to these issues... well at least the majority of them.

The 790i, like the other 7- and 6-series chipsets from NVIDIA, incorporates asynchronous memory overclocking. For those that aren't in the know, this means being able to theoretically max out the memory frequency while maintaining a given FSB and multiplier and end CPU frequency. For example, this means there is the potential to run a range of memory frequencies such as DDR3-1600 and DDR3-1800 while maintaining a given FSB frequency and multiplier such as 400MHz FSB



and a 9x multiplier, which results in an end CPU frequency of 3.6GHz.

In essence, what this asynchronous memory overclocking really is, is a plethora of memory dividers – far more than commonly available on any motherboard – and these memory dividers are implemented and activated upon the user keying in a memory frequency value in the BIOS. What this also means is that the memory will not always be running at exactly the same frequency as keyed in by the user. For example, if on a given FSB frequency the user keys in a value of 1600 for DDR3-1600 and the closest the dividers can get the memory is DDR3-1595 then this is the frequency of the memory, not DDR3-1600.

As many enthusiasts would be well aware,

there are golden ratios within computing. This implementation of asynchronous memory dividers, while great for obtaining and/or maintaining compatibility between a CPU and motherboard combination's FSB frequency and the memory used, means there are certain ratios that will incur a performance deficit.

Such a demonstration of these adverse affects on the system memory subsystem can be seen in the results of the Super Pi 4M test, as well as the Everest results.

In Super Pi it is a known fact that at the same end CPU frequency, as the FSB frequency scales upwards, so does the total system performance. Therefore in traditional situations, i.e. those using common dividers such as 1:1, 2:3, 3:4, 4:5, 1:2 etc, the performance will scale in a positive fashion. By looking at the results obtained during testing of the 790i Ultra SLI, it is evident that the obscure, and often harsh, dividers implemented by the

## Standard benchmark results

45nm Core 2 Quad used in testing	333x9; DDR3-1600 7-6-6-18 2T			429x7; DDR3-1600 7-6-6-18 2T			500x6; DDR3-1600 7-6-6-18 2T			475x8; DDR3-1780 7-7-7-20 1T			480x8.5; DDR3-1800 7-7-7-20 1T		
Super Pi 4M	1m 27.843s			1m 28.140s			1m 29.310s			1m 12.431s			1m 07.486s		
wPrime 32M	13.074s			13.058s			13.059s			10.423s			9.829s		
Hexus Pi Fast	30.73s			30.81s			31.64s			25.04s			23.57s		
CineBench – single-thread	3202			3230			3196			4095			4442		
CineBench – multi-thread	11547			11516			11588			14131			15657		
Everest read	10108MB/s			9080MB/s			8224MB/s			8613MB/s			8712MB/s		
Everest write	7111MB/s			8408MB/s			10599MB/s			9979MB/s			10237MB/s		
Everest latency	53.9ns			69.0ns			78.0ns			74.2ns			75.0ns		
Crysis (1 card)	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max
	20.72	13.83	23.51	13.83	12.34	23.58	20.73	12.66	23.75	DNF	DNF	DNF	DNF	DNF	DNF
3DMark06 (1 card)	13,162			13,170			13,191			13,812			DNF		
3DMark03 (1 card)	40,725			40,786			41,009			42,683			DNF		



asynchronous clocking by the chipset has resulted in a net negative impact on the overall system performance; similar though not quite as evident impacts can be found in the Pi Fast results.

One very important area impacted by this poor memory access is the overall memory read bandwidth and overall latency. While the write speed is not impacted by the problem, the read bandwidth drops off dramatically, or simply does not scale as it should in accordance with increased FSB frequency/bandwidth. This lack of scaling then incurs a performance loss on the memory response time, with latency times returning values much higher than their Intel chipset counterparts.

While the 780i SLI was, for all intents and purposes, simply a 680i SLI motherboard with the nForce 100 chip replaced with an nForce 200 chip, the 790i is a completely new chipset architecture due to, in a large part, the inclusion of DDR3 on the NVIDIA SLI motherboard platform. This is great news for the enthusiast who demands the performance of DDR3, but was previously restricted to a DDR2-based platform if wishing to implement SLI in the system.

Obviously, with a new chipset and inclusion of such a radical change to a major sub-system – the

DDR3 memory – the motherboard does tend to have some quirks – most of which we hope can be fixed with some decent BIOS research and development.

The first such issue is to do with the manner in which DDR3 is handled. Firstly, and perhaps

frequency and latency combinations outside of that stock value.

On an Intel X48 or X38 platform, the labs Corsair Dominator DDR3-1800 C7 kit effortlessly maintains frequency and latency combinations such as DDR3-1600 6-6-6-18 1T and DDR3-2000 8-8-8-24 2T. However due to the limitations of the vdimm available on the 790i Ultra SLI, these same modules could not maintain stability at DDR3-1600 6-6-6-18 1T and instead had to be relaxed to DDR3-1600 7-6-6-18 2T.

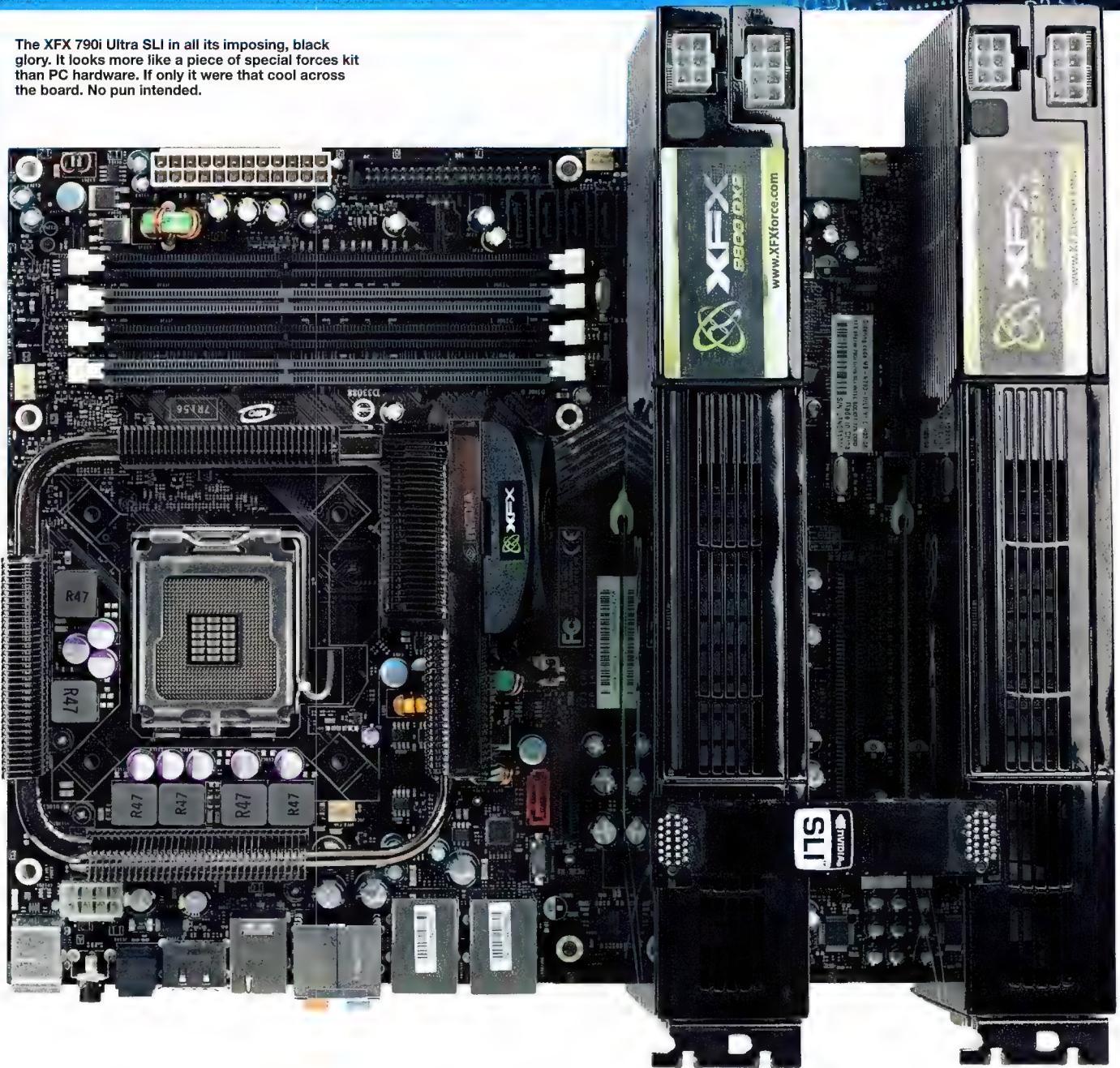
“...you'll need good karma to sustain any stable and worthwhile frequency and latency combinations...



the most annoying for us as enthusiasts, is the restrictive memory voltage (vdimm) values available through the BIOS, a rather meager 2.0v. Not only is this annoying to begin with but it then drops to between 1.96v and 1.94v. Good luck to anyone with Corsair Dominator DDR3-1800 C7 memory rated for 2.1v. While you'll still be able to obtain the stock frequencies due to the headroom often calculated into the voltage requirements, you'll need good karma to sustain any stable and worthwhile

Furthermore, having changed to a CAST7 memory latency set, upon booting and going through the POST the system displayed the memory timings as using CAS8 latency sets at 8-6-6-18 2T. To assure no human error the memory latencies were checked and rechecked in the BIOS and the value of 7 was set for the CAS latency. Additional confusion was added when within Windows both CPU-Z and Everest reported the memory timings as running at the desired 7-6-6-18 2T – weird. While still getting

The XFX 790i Ultra SLI in all its imposing, black glory. It looks more like a piece of special forces kit than PC hardware. If only it were that cool across the board. No pun intended.



to 'know' the board and the relative performance due to the asynchronous memory overclocking, it is difficult to ascertain whether the system is indeed utilising CAS7 or CAS8 memory latencies.

Taking a jump back for a moment to the voltage regulation on this motherboard, we found the vcore, just like the 680i/780i motherboards, to once more have considerable vdrop and vdroop. As a result of this issue, 1.5v vcore set in BIOS resulted in a boot value of 1.44v which would then droop to 1.42-1.43v under load.

While it may sound like we're panning this motherboard, in all honesty we're not. This is a great board, but we cannot help but feel that some of the enthusiast expectations for the 790i Ultra SLI have not been met, albeit by only a hair's width.

So what is good about this board?

For starters, considerable effort was put into the board's FSB overclocking capability. The

original 680i motherboards were poor quad core overclockers; a revision then rectified this to a certain degree, but Intel chipset-based motherboards still very often obtained higher FSB frequencies.

To battle this NVIDIA obtained a number of high FSB overclocking processors through enthusiast channels and focused R&D on the development of a chipset that could obtain high FSB frequencies. We're happy to say that the company's efforts have paid off.

Using a 45nm Core 2 Extreme quad core processor known to have a maximum FSB frequency around the 470MHz area, we were able to maintain stability at a new high of 500MHz. For an enthusiast trapped on a lower-locked multiplier, for example 8x, this then calculates into an additional 240MHz potentially available from the 8x locked CPU.

There are similar reports that the 45nm dual core Wolfdale processors are seeing chips that did 560-580MHz on Intel chipsets now smashing the 600MHz FSB barrier.

With FSB overclocking taken care of, it's disappointing to then see that the board still uses a large majority of electrolytic capacitors rather than solid state capacitors. Like the 780i and the 680i before it, the solid state capacitors are once again only implemented around the CPU socket area. It's an overall mixed performance, that while great in some areas, still let us down in others. Next time, Gadget, next time.

**SCORE** **7.5** OUT OF 10

atomic

# Enthusiast System-Architecture (ESA)

**Josh Collins** expects good things from ESA, and so far it's delivering in spades.

## SPECS

**Price** FREE! ...If you own the right hardware  
**Specifications** NVIDIA 780i or 790i motherboard and ESA compliant hardware

The Enthusiast System-Architecture, or ESA as it is more commonly known, is an open platform standard initially conceived by NVIDIA and then shared with and pushed by a considerable number of manufacturer partners.

NVIDIA's partners in this grandiose plan to provide enthusiasts with a protocol that provides real-time communication and system control include the likes of OEM heavy weights Dell, HP and Alienware, motherboard giants such as ASUS, GIGABYTE, MSI, XFX and EVGA and cooling and PSU power houses such as Silverstone, Coolermaster, Tagan, PC Power and Cooling and Thermaltake.

With an already strong list of partners, most of whom are gradually updating product lines with ESA compliant and tested hardware revisions, the move to push this open standard has truly opened up and gotten some pace behind it.

But still, what the goodness gracious is it?

The concept behind ESA is to provide an open protocol for manufacturers and vendors that offers real-time communication between sub-systems of the PC. This allows for different areas to be tweaked for thermal, acoustic and performance characteristics.

Perhaps the coolest aspect of ESA is its ease of use. The application has very obviously been written with high priority and focus on the end user being able to not only easily interpret the information but also to customise how they interact with it.

For example, the GPU temperature monitor is not only straight forward to acknowledge visually but can be given a unique name instead of the default one.



Note: Due to late arrival, the Thermaltake Big Water 780e is not shown in the system photograph

Furthermore the actual polling of the temperature read by the onboard temp probe can be change to poll at a maximum value of 60 second intervals and a minimum of a flush 500ms. Additionally, to ensure that a component doesn't overheat during operation, a temperature threshold can be set, and there's an option for the system to give a visual alert – great for those hot summer months!

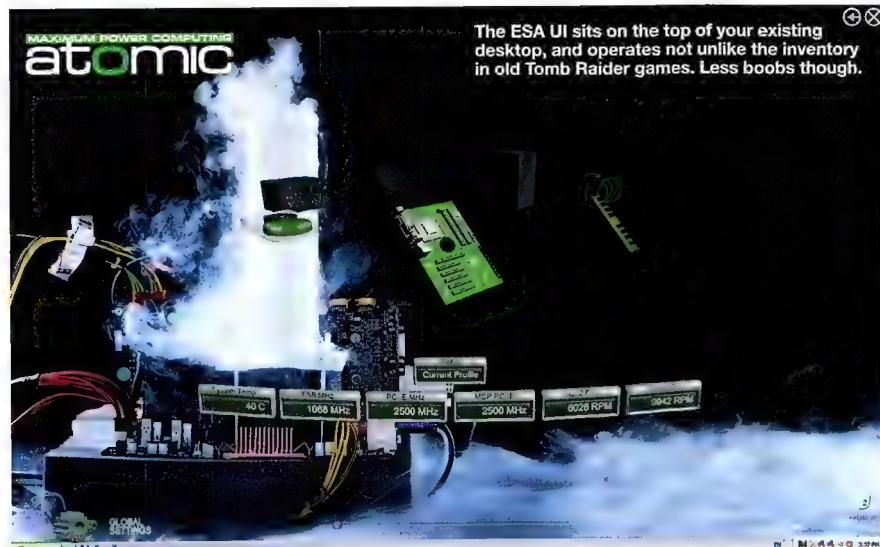
Being the enthusiast-minded chaps we are, one of the first questions that came to mind when we came across this protocol was the level of impact and overhead this would have on system performance. Much to our pleasure we were informed that, even when polling every 500ms, ESA would use less than one per cent of system resources. We don't

know about the rest of you but to see such a bounty of system information, with such a low overhead, certainly left an impression on us.

With the ability to modify polling latencies you also get a lot of power over thermal and acoustic characteristics, like being able to turn fans down from 100 per cent to 75 per cent for better acoustics, and then up again for performance while gaming, and this open standard allows this to be done all through a single application rather than the myriad of programs needed otherwise.

If you happen to have recently purchased a 780i- or 790i-based motherboard, download the available software from the NVIDIA website or install it from the driver disc and check it out. For the rest of us, keep your eyes peeled as ESA compliant hardware begins to become more readily available on the retail market.

After our experience with the platform we hope this can grow to be an accepted standard, but with standards popping up every which way recently – especially in the audio visual arena – we hope that this one can get its footing and stand firm. 



## THE ATOMIC ESA COMPATIBLE TEST MACHINE

**Motherboard:** NVIDIA 790i Ultra SLI  
**Memory:** Crucial Ballistix DDR3-2000 C9  
**Graphics:** XFX 8800GTX 768MB in SLI  
**PSU:** Tagan 1100W  
**Case:** Silverstone TJ10 ESA Edition  
**Cooling:** Thermaltake Big Water 780e

# ASUS P5E3 Premium

**Josh Collins** finds out how the Premium stands up against the Deluxe.

SPECS	
Price	\$589
Supplier	ASUS
Website	<a href="http://www.asus.com.au">www.asus.com.au</a>
Specifications	Socket 775; Intel X48 northbridge; ICH9R southbridge; ATX form factor; solid state capacitors; 802.11g onboard wireless; 2x PCIe 2.0 x16; 2x PCI; 1x PCIe x1; 1x EIDE; 6x SATA; 1600MHz FSB; DDR3-1600.

**B**ig things were expected of this otherwise humble high-end motherboard, considering its strong heritage. Not only that, but X48 is yet to be officially released – or as we snigger, officially acknowledged – by Intel, even though all major partners such as GIGABYTE, ASUS and MSI have already been steadily releasing X48-based products since January. Heck, even DFI is polishing the final touches on its X48 board.

The P5E3 Premium is the X48 incarnation of the P5E3 Deluxe, based on the X38 chipset. Knowing this, we were curious to discover what was different... or rather, what wasn't.

Visually the two models, the Premium and the Deluxe, look exceptionally similar, featuring near identical component layout. Additionally, the Premium still incorporates standards we've come to expect from high-end ASUS motherboards such as solid state capacitors and dual 16x electrical PCIe slots, with an additional slot running 8x electrical. Also included are features such as DDR3 memory and 45nm processor support; we also hoped for the same overclocking potential experienced with the Deluxe.

What we received was very much what we expected.

The P5E3 Premium was an almost already entirely spoken for board from the get go. There was simply no getting to know this motherboard. Why? To us, it was a P5E3 Deluxe with a glorified

X38 chipset in the form of the X48, tucked snuggly under a passive heatsink with some pretty blue painted metal trimmings to differentiate it from the silver colouring on the Deluxe model.

For many products in this cut throat market, to be the same is to be non-existent, or at best lesser than the original, first, pioneer or whatever initially set the benchmark. For this particular contender it was fortunate to have had such a smooth road laid out for it to travel on. With the P5E3 Deluxe being a board that we enjoyed working with – we even used it for the torturous

blunt for a moment – we like this board.

The P5E3 Premium did everything we asked of it and unsurprisingly, it did it all in much the same manner as the Deluxe. Even the BIOS options are laid out in exactly the same manner, at least as far as we could see. Furthermore, and adding to our cynicism about the X48 chipset, it performed identically to the X38-based P5E3 Deluxe.

**“ For many products in this cut throat market, to be the same is to be non-existent... ”**

memory roundup last month (I'm yet to decide if it tortured me or the modules tested –Josh) – all the P5E3 Premium had to do was live up to its brother. Easy... right?

Ask any sibling and they'll tell you it ain't easy being compared to your brother or sister; be it older, younger or even the same age. Well, we're sure that if you asked PC components of the same family or silicon (blood) lines, they'd answer much the same way.

If you haven't read between the lines yet, let's be

But if you're like us, you're still crying out wondering what in the name of all things Atomic is different between the P5E3 Premium and the P5E3 Deluxe. If we may be blunt once again, it's about \$200 no longer in your pocket – that is the difference.

Seeing as there is nothing other than some performance binning of the chipset splitting the difference between the X38 and X48, and having enjoyed the strong performance experienced from the P5E3 Deluxe, we were left feeling like we'd just taken a P5E3 Deluxe for a second spin around the block, only this time Xzibit pimped it first.

With next to no performance difference found between the two, a price difference floating around the \$200 mark and a far, far more immature post-release product development cycle (BIOS updates etc), it's a sad fact that the X38-based Deluxe model out shines its X48-based Premium brethren.

As was expected, this motherboard is a strong performer but if you're interested in buying the board; do yourself a favour and just buy the Deluxe instead. That, or enjoy throwing away your hard earned cash – we know what we'd be opting for. ☺

45nm Quad	400x7.5; DDR3-1600 6-6-6-18 1T	400x9; DDR3-1600 6-6-6-18 1T	400*10; DDR3-1600 6-6-6-18 1T	460x7; DDR3-1534 6-6-6-18 1T	444x9; DDR3-1778 7-6-6-18 1T
<b>Super Pi 4M</b>	1m 22.805s	1m 10.621s	1m 04.459s	1m 17.859s	1m 03.523s
<b>wPrime 32M</b>	12.87s	10.748s	9.656s	11.966s	9.672s
<b>Hexus Pi Fast</b>	30.06s	25.35s	23.13s	28.10s	22.90s
<b>3DMark06</b>	13472	13847	14011	13596	14042
<b>CineBench – single thread</b>	3318	3975	4428	3568	4432
<b>CineBench – multi-thread</b>	11864	14201	15817	12663	15800
<b>Everest Read</b>	10503MB/s	10886MB/s	11115MB/s	10734MB/s	12056MB/s
<b>Everest Write</b>	8528MB/s	8539MB/s	8500MB/s	9804MB/s	9482MB/s
<b>Everest Latency</b>	53.9ns	51.4ns	51.0ns	53.0ns	46.7ns



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# ASUS Striker II Extreme

**Josh Collins** is along for the ride as the Striker II goes Extreme with 790i.

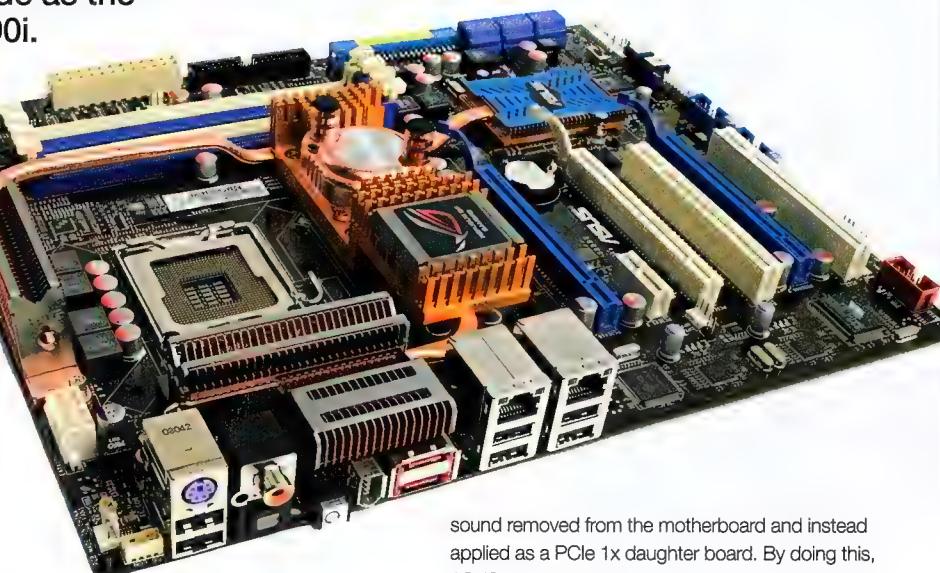
SPECS	
Price	\$704
Supplier	ASUS
Website	<a href="http://www.asus.com.au">www.asus.com.au</a>
Specifications	Socket 775; NVIDIA 790i SPP and MCP; ATX form factor; all solid state capacitors; 3x PCIe 2.0 x16; 2x PCI; 2x PCIe x1; 1x EIDE; 6x SATA II; 1x FireWire; 1600MHz FSB; DDR3-1600; 2x eSATA; 6x USB 2.0 on rear I/O; 2x gigabit LAN

This month we had the opportunity to not only take a gander at the reference 790i motherboard – the XFX 790i Ultra SLI – but also the ASUS non-reference Striker II Extreme, also based on the 790i chipset.

First and foremost, it's important to understand the difference between a reference design and non-reference design, so a quick lesson for those not yet informed is in order.

The biggest difference is that the reference design, as the name implies, is a base design for reference from the inventor, in this case, NVIDIA. This is the design that NVIDIA used to develop the chipset and platform, and incorporates all of the features, settings and all sorts of specifics preferred by NVIDIA for this platform. This could mean using a certain type of capacitor, a particular component layout design or specific limitation on available voltages etc.

On the flip side is the non-reference design, which is more or less the opposite of all of the previously mentioned areas. This means the board is designed in-house by the vendor's engineer team and implements the preferences and specifics set



noticeably different to the reference design. At a purely visual level, the Striker II Extreme doesn't sport the industrial look found on the 790i Ultra SLI. This is achieved by utilising the colour scheme we've grown accustomed to seeing on the Republic of Gamers (R.O.G.) line of motherboards – black, blue and white are the prominent feature colours.

Also differing from the reference design and conforming to a feature found among the R.O.G. motherboards is the MCP, SPP and MOSFET cooling solution. The cooling used is completely different in design to the reference cooling found on the XFX 790i Ultra SLI also reviewed this month. The Striker II Extreme's solution incorporates a water cooling option with inlet and outlet barbs

**“The cooling used is completely different in design from the reference cooling found on the XFX 790i Ultra SLI.”**



by the vendor; in this case ASUS, rather than the original platform designer and developer.

As a result of the non-reference design, the ASUS Striker II Extreme has the potential to bring to market unique features otherwise not provided by the reference design. This might be the inclusion or exclusion of additional slots, ports or peripherals or simply adding further features and improvements

At the end of the day, what it means for the enthusiast is greater freedom of choice when it comes to selecting a motherboard based on a certain platform or chipset.

First and foremost, the Striker II Extreme looks

converting the conventional air based cooling option into a chipset water block type heatsink. ASUS call this the Fusion Block System, and it can be found on other motherboards in the R.O.G. line of motherboards as well.

Interestingly, ASUS obviously felt that NVIDIA had the expansion slot layout down to a fine art and followed suit with an identical slot layout – three PCIe 16x slots, two PCIe 1x slots and two PCI slots. Note, however, that the top PCIe 1x slot, the one coloured black, is used if the end user chooses to implement the supplied SupremeFX II sound card. This supplied sound card is simply the onboard

sound removed from the motherboard and instead applied as a PCIe 1x daughter board. By doing this, ASUS makes way on the actual motherboard PCB to include additional features or further back already included features.

Due to being a part of the R.O.G. series of motherboards, the Striker II Extreme also features onboard on/off, reset and CMOS clear switches, with the two former found on the bottom right of the board layout and the latter on the rear I/O panel for easy access when installed in a case.

Also integrated into the design of this motherboard is, not surprisingly, yet another feature that is common place among the R.O.G. line of ASUS motherboards – an LCD POST display screen. This is a little beauty when overclocking and allows for easy and accurate diagnosis of when an overclock fails in making it all the way into the operating system. This is accomplished by displaying the stages of the power on self test (POST) and effectively showing where the system is hanging in the boot-up process.

This means that if, for example, the system freezes during the moment the display shows 'det\_dram', it can be understood that the system hung when detecting and initialising the memory.

Now the aesthetics and some minor functionality have been covered, it's time to dive into the hardware specifics of this non-reference 790i platform.

First and foremost it, obviously, utilises the 790i SPP and MCP. As a result it sports three PCIe x16 slots with a full x16 electrical transfer, lending itself to support 3-Way SLI with full bandwidth to all cards. Much the same as the nForce200-backed 780i SLI based platform.

Also akin to the XFX 790i Ultra SLI – and every other 790i motherboard for that matter – the ASUS Striker II Extreme features full DDR3 support. The point of difference in this specific area, however, is the implementation of two-phase power supply to the memory. This assures a cleaner power supply to the DIMMs and, as we've





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45nm Core 2 Quad used in testing	333x9; DDR3-1600 6-6-6-18 1T	400x7.5; DDR3-1600 6-6-6-18 1T	429x7; DDR3-1608 6-6-6-18 1T	400x7.5; DDR3-1800 7-7-7-20 1T	400x10; DDR3-1800 7-7-7-20 1T										
<b>Super Pi 4M</b>	1m 24.755s	1m 23.507s	1m 25.441s	1m 23.835s	1m 05.801s										
<b>wPrime 32M</b>	12.853s	12.855s	12.900s	12.820s	9.719s										
<b>Hexus Pi Fast</b>	30.90s	30.28s	30.55s	30.33s	23.32s										
<b>CineBench – single-thread</b>	3315	3324	3317	3320	4409										
<b>CineBench – multi-thread</b>	11594	11809	11807	11869	15696										
<b>Everest read</b>	10293MB/s	11705MB/s	9369MB/s	11353MB/s	12045MB/s										
<b>Everest write</b>	7111MB/s	8516MB/s	9146MB/s	8525MB/s	8505MB/s										
<b>Everest latency</b>	53.7ns	51.2ns	68.0ns	52.7ns	49.9ns										
<b>Crysis (1 card)</b>	Avg 19.87	Min 12.44	Max 22.87	Avg 19.88	Min 12.92	Max 22.79	Avg 19.89	Min 12.65	Max 22.80	Avg 19.89	Min 12.60	Max 22.76	Avg 19.89	Min 14.84	Max 22.79
<b>3DMark06 (1 card)</b>	12805	12885	12822	12833			13352								

seen in other R.O.G. boards sporting the feature, it commonly leads to high overall overclocks with less voltage required.

Jumping into the BIOS of the Striker II Extreme was an interesting experience. With the reference design XFX 790i Ultra SLI benched just before the Striker II Extreme, we'd come to accept restrictive levels of voltage adjustments.

Like a keen shopper at the doors of Westfield on Boxing Day, we couldn't wait to get into the BIOS to see what voltage options we'd find, as we held hopes of far from reference voltage adjustments. Our prayers answered, we were left like a fat kid in a donut parlor.

– to use such a vcore setting in a 24/7 system would see imminent failure.

At the end of the day this board has much more 'enthusiast level' voltage options available to the end user.

Even equipped with the extra volts to get the job done we were rather disappointed by the maximum FSB frequency achievable on this motherboard. Using the same 45nm Core 2 Quad as used for the 500MHz max on the XFX 790i Ultra SLI, we were only able to achieve an abysmal 430MHz FSB. While one may argue that perhaps additional time was necessary to weed out further FSB frequency (though we assure you, we spent a lot of time on

**“... perhaps the most defining ‘feature’, if you will, that separates the two boards is the asking price.**



The Striker II Extreme features some enthusiast-enlightened voltage parameters, such as a ridiculous max vdimm of 3.1v – you'll be killing modules quickly at anything above 2.3v and max 24/7 use should be 2.1v. Following this the NB vcore maxed out at 2.20v, opposed to the reference design with a max 1.75v. A similar trend was also found for the CPU vcore, with a max of 2.40v available.

However, we were unsure whether these values were actually achievable, the most notable being the CPU vcore as we've seen boards in the past that touted 2+v vcore options only to have the over voltage protection (OVP) cut in between 1.9v and 1.95v. Unfortunately, we did not get a chance to put this board under sub-zero cooling to test the real max vcore. That said, we can say that we did experience the NB vcore running upwards of 1.86v, which was more than enough by anyone's measure and excessive even for short benchmarking stints

both of the boards), it can be just as easily argued that it's not a good sign of the motherboard's user friendliness if it takes a PHD dedicated to the Striker II Extreme to regain the 70MHz FSB lost between it and the XFX 790i Ultra SLI.

What the Striker II Extreme may lack in FSB headroom, it does manage to make up for with memory overclocking capability. With greater than 2.0v available from this motherboard for some top DDR3 performance, the labs Corsair Dominator DDR3-1800 C7 kit happily benched at DDR3-1600 6-6-6-18 1T and DDR3-1800 7-7-7-20 1T.

What this means, keeping in mind the implications of the asynchronous memory overclocking mentioned in the XFX 790i Ultra SLI review, is that due to the extra voltage to force tighter memory latencies at the same given FSB and CPU frequencies, the Striker II Extreme is more efficient. For a direct comparison, check out all the bandwidth dependent results at 429MHz FSB with



a 7x multiplier. Please also note that the Striker II Extreme 3D tests were done with an 8800GTX with slower stock clocks than the sample used for the XFX 790i Ultra SLI testing, hence the discrepancy in 3D results between the two.

Last, but most certainly not least, perhaps the most defining 'feature', if you will, that separates the two boards is the asking price. With about a \$200 difference, at the end of the day the Striker II Extreme is priced right out of the game. As much as the board performs considerably well and offers aspects not available from others on the market, an asking price of \$700-odd feels more like being told to bend over in a prison shower than being gifted the power to save the gaming and tech universe.

Give us some value and we'll begin to care, ASUS.

**SCORE** **6.5** **OUT OF 10**

# XFX 9800GX2

NVIDIA drops a new generation into the market but is it any good? **Josh Collins** finds out.

## SPECS

**Price** \$872  
**Supplier** XFX  
**Website** [www.xfxforce.com](http://www.xfxforce.com)  
**Specifications** 600MHz core; 1000MHz memory (2000MHz effective); 1500MHz shader; based on 65nm G92 core; 256 (128x2) stream processors; 1024MB (2x512MB) GDDR3; dual slot PCB with active cooling solution; 6-pin + 8-pin PCIe power connector

**W**e've been joking over the past couple months about 'another month, another NVIDIA release' and, true to form the green corner has let another card out to play.

What's different this time around is that the new player in the graphics race marks the introduction of the new high-end product for the 9-series generation, as well as NVIDIA's first dual GPU core/single card solution. We saw the 'next-gen' series make its debut in the form of the 9600GT last month, and we were suitably impressed by that budget offering. Now it's time for the big boys to come out to play and we've been waiting some time now for this arrival.

First though, you need to know some background on this new beast, the 9800GX2. To get the ball rolling, the 9800GX2 uses two G92-based cores; these are the same series of cores that made an appearance in the 8800GTS 512MB. As such, and rather unsurprisingly, this means each

core sports 128 stream processors per core and 512MB of GDDR3 memory dedicated per core. Paired with this is a 256-bit memory interface, dedicated per core memory allocation. As a grand total, we have two G92 cores, a sum of 256 stream processors and 1024MB (1GB) of memory running over a split memory interface with each 'lane' operating at 256-bit.

A bit of a mess if you ask us and to keep things simple, it can be summed up with one very simple phrase; "it's like two 8800GTS 512MB thrown together to make a GPU sandwich that's running in SLI".

So, if we 'compare the pair', as those annoying superannuation TV ads like to say, we'd come up with something along the lines of the table below – oh, and to spice things up we threw in a pair of overclocked 8800GTX in SLI, too.



Here we can begin to see similarities, particularly between the 9800GX2 and two 8800GTS 512MB in SLI. It can be seen that the 9800GX2 uses the same core, the G92, and therefore also has the same amount of stream processors, memory capacity, memory interface bit size etc. It's interesting to note the drop in core and shader frequencies; this is presumably due to the thermal restrictions of having a single heatsink sandwiched between two cores and trying to effectively cool both.

The XFX-branded model has a premium price point, while the cheapest in the market goes for about \$100 less and runs the same reference design clock speeds. The card is bundled with a full version of Company of Heroes, though we're still wondering what the extra \$100 gets you. Perhaps this is the price of branding, or maybe the surcharge for the box artwork, which is reminiscent of work by world renowned German graffiti artist, Seak ([www.seakone.com](http://www.seakone.com)).

When looking at the numbers produced by our benchmarks, we couldn't help but feel an urge to buy two 8800GTS 512MB rather than a single 9800GX2 – the only requirement of course being an SLI compatible motherboard. This is one area where the 9800GX2 does gain at least something. With no motherboard specific requirements, other than the PCI express slot it sits in, the 9800GX2 offers performance akin to that of an SLI system without requiring an expensive SLI motherboard.

If you've already got an 8800GTS 512MB card and an SLI compatible motherboard and you're looking for a boost, we suggest a second card over purchasing a single 9800GX2 – get two and that's a different story, though, both for your 3D experience and your wallet!

To round this all up, this card really feels like what would be more appropriately named an 8800GX2 or 8900GX2, if only the marketing mob didn't wish to push out a new series of cards blazoned with a preceding 9 – the 7900 series worked fine, why not an 8900 series? Because we're certainly not seeing a generational leap in performance.

	Single 9800GX2	8800GTS SLI	8800GTX SLI
<b>Core codename</b>	G92	G92	G80
<b>Stream Processors</b>	128	128	128
<b>Core clock</b>	600MHz	650MHz	630MHz
<b>Shader clock</b>	1500MHz	1625MHz	1350MHz
<b>Memory clock</b>	1000MHz	972MHz	1000MHz
<b>Total memory</b>	1024MB (2x512MB)	1024MB (2x512MB)	1536MB (2x768MB)
<b>Memory interface</b>	256-bit	256-bit	384-bit

### 9800GX2 vs 8800GTS vs 8800GTX results breakdown

45nm Core 2 Quad @ 400x10; DDR3-1800 7-7-7-20 1T

	Crysis			3DMark06	3DMark03
	Avg	Min	Max		
<b>1x 9800GX2 1GB</b>	38.77	25.87	44.28	19788	64499
<b>2x 9800GX2 1GB</b>	54.12	22.10	76.52	20237	88643
<b>1x 8800GTS 512MB</b>	20.32	15.51	23.35	14176	41583
<b>2x 8800GTS 512MB</b>	31.74	21.58	40.68	20009	68217
<b>1x Overclocked 8800GTX 768MB</b>	20.71	13.98	23.54	13953	43238
<b>2x Overclocked 8800GTX 768MB</b>	29.85	21.74	42.59	19169	66366

SCORE

**6.5**  
OUT OF 10

atomic

# GALAXY

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## GEFORCE<sup>®</sup> 9600 GT

512MB 256BIT DDR3

- PCI Express 2.0 Support
- 64 Stream Processors
- NVIDIA<sup>®</sup> Unigrid Architecture
- NVIDIA<sup>®</sup> SLI-Ready
- Full Microsoft DirectX10<sup>™</sup> SM 4.0 Support
- NVIDIA<sup>®</sup> PureVideo<sup>™</sup> HD Technology
- Dual Dual-Link DVI



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VIC	PC Case Gear	03 9584 7266	<a href="http://www.pccasegear.com">www.pccasegear.com</a>	Scorpion Technology	1300 726 770	<a href="http://www.scorptec.com.au">www.scorptec.com.au</a>
SA	Allneeds Computers	08 8211 8661	<a href="http://www.allneeds.com.au">www.allneeds.com.au</a>	Getright International	08 8362 0622	<a href="http://www.getright.com.au">www.getright.com.au</a>
WA	Netplus Micro Computer	08 92427288	<a href="http://www.netplus.com.au">www.netplus.com.au</a>	PLE Computers	08 9309 4771	<a href="http://www.ple.com.au">www.ple.com.au</a>
QLD	Umart Online Custom Computer Services	07 3369 3928 07 5493 8277	<a href="http://www.umart.com.au">www.umart.com.au</a> <a href="http://www.ccscomputers.com.au">www.ccscomputers.com.au</a>	PC Shopper Game Dude Pty Ltd	07 3397 0777 07 3387 1500	<a href="http://www.pcshopper.com.au">www.pcshopper.com.au</a> <a href="http://www.gamedude.com.au">www.gamedude.com.au</a>
TAS	Office Equipment Warehouse P/L	03 6272 6272	<a href="http://www.oewcomputer.com">www.oewcomputer.com</a>	Taspro Computers	03 6424 1911	<a href="http://www.taspro.com.au">www.taspro.com.au</a>

# Zotac 9800GTX 512MB

Is NVIDIA continuing to rule the graphics card roost?  
Josh Collins is beginning to wonder...

**Price** \$TBA  
**Supplier** Zotac  
**Website** [www.zotac.com](http://www.zotac.com)  
**Specifications** 675MHz core;  
 1100MHz memory (2200MHz effective); 1688MHz shader; based on 65nm G92 core; 128 stream processors; 512MB GDDR3; single slot PCB with active dual slot cooling solution; two 6-pin PCIe power connector

Accompanying the 9800GX2 this month for the launch of the high-end 9-series cards is the 9800GTX.

The sample we're checking out here is from the nice folks at Zotac and follows the NVIDIA reference design. As such it features a 675MHz core, 1100MHz memory (double data rate of 2200MHz) and a shader frequency of 1688MHz. This all stems from the G92-based core which, surprise, has 128 stream processors and a 256-bit memory interface – yup, just like the 8800GTS 512MB and 9800GX2.

The card is a two slot behemoth with a black plastic shroud covering the full face of the card's heatsink and front area. Peaking out from the side of this veil of darkness is a set of two 6-pin PCIe power

one month later popped up in the 8800GTS 512MB with 124 stream processors. Not content with that, it showed its face again in the 8800GS 384MB card. Now that it's in both the 9800GX2 and 9800GTX, we're kind of over the ol' girl, to be honest. If anything, it feels like NVIDIA is beating a dead horse to get that one last lap out of it.

Granted, there are two GPUs in the 9800GX2 and the 9800GTX features higher clock speeds, but it still feels like an 8800GTS 512MB. Be it as a single card or an SLI configuration.

We've gotten to know NVIDIA for its generational leaps over the past years. The 6800GT and 6800Ultra simply sat on the older

TechPowerUp GPU-Z 0.1.7		
Graphics Card	Sensors	Validation
Name	NVIDIA GeForce 9800 GTX	
GPU	0612	Revision A2
Technology	nm	Die Size mm <sup>2</sup>
BIOS Version	62.92.38.00.05	
Device ID	10DE - 0612	Subvendor NVIDIA (10DE)
ROPs	8	Bus Interface PCI-E 2.0 x16 @ x16 2.0
Shaders	0 Pixel / 0 Vertex	DirectX Support /SM
Pixel Fillrate	5.4 GPixel/s	Texture Fillrate Unknown
Memory Type		Bus Width Unknown
Memory Size	512 MB	Bandwidth Unknown
Driver Version	nvlddmkm 7.15.11.7440 (ForceWare 174.40) / Vista	
GPU Clock	675 MHz	Memory 1100 MHz Shader 1688 MHz
Default Clock	675 MHz	Memory 1100 MHz Shader 1688 MHz
NVIDIA SLI		Disabled
NVIDIA GeForce 9800 GTX		<input type="button" value="Close"/>

**“ If anything, it feels like NVIDIA is beating a dead horse to get that one last lap out of it. ”**

connections. While the card itself is covered from left to right, it still maintains the ability to look like a graphics card. On the flip side, the 9800GX2 simply looks like a black plastic and metal brick with a PCIe connector popping out. That, or one of those chunky Time Zone blasters – we couldn't quite decide.

Unlike the release of the 8800GTX, or for that matter the 7800GTX and 6800Ultra, there really isn't anything new being presented to us here. The core used debuted as a cut-down version in the 8800GT 512MB with 112 stream processors, and

5-series – not that it was going to be hard – and the 7800GT and 7800GTX followed in similar fashion. As the 7800 series grew old a refresh appeared and thus we were presented with the 7900GT, 7900GTX and 7900GS.

Now let's take a look at the 8800-series life cycle. Like its relatives, the 8800GTX and 8800GTS (640MB and 320MB models) came in and wiped the floor with the previous generation. As the series grew old another refresh came in. As the G70-based 7800GT/GTX was refreshed with the

G71 based 7900GT/GTX, many were expecting to see the 8800GTS/GTX refreshed with a model something along the lines of an 8900GTS/GTX based on a G81 core. But this was not to be so.

Instead we received the G92 based 8800GT 512MB and later the 8800GTS 512MB and then a later model again in the form of the 8800GS 384MB – this we've covered. Fair call, many thought, and awaited another more powerful core to come through, and like history had shown us, wipe the floor with nearly two times the graphic grunt. The brutal truth however is that this hasn't happened and dare we say this seems a repeat of the GeForce 4 to GeForce 5 change over – we bloody hope it's not!

If you haven't guessed it, the 9800GTX 512MB didn't really impress us. It's a fast card; certainly faster than other single core single GPU solutions out there, but to be given the 9-series tag, it really did leave quite a bit to be desired. With an 8800GTS 512MB going for as low as \$330-\$370 for the cheaper brands, we suggest getting one of them and overclocking the pants off of it – don't be hurt in the wallet just because you're an enthusiast!

**NOTE:** This card arrived after photography day. Sorry for the lack of pretty pictures!

## 9800GTX vs 9800GX2 vs 8800GTS vs 8800GTX results breakdown

45nm Core 2 Quad @ 400x10; DDR3-1800 7-7-7-20 1T

	Crysis			3DMark06	3DMark03
	Avg	Min	Max		
1x 9800GTX 512MB	22.95	17.89	26.09	14973	43278
1x 9800GX2 1024MB	38.77	25.87	44.28	19788	64499
1x 8800GTS 512MB	20.32	15.51	23.35	14176	41583
1x 8800GTX 768MB	20.71	13.98	23.54	13953	43238

**SCORE** **6.0** OUT OF 10

# ASUS 8800GT 1GB TOP

## SPECs

Price \$350  
 Supplier ASUS  
 Website [www.asus.com](http://www.asus.com)  
 Specifications 600MHz core; 900MHz memory (1800MHz effective); 1500MHz shader; based on 65nm G92 core; 112 stream pipelines; 1024MB (1GB) GDDR3; custom dual slot active cooling solution; single 6-pin PCIe power connector; custom ASUS PCB design - non-reference

As the 9-series phases in there will be certain models that will be phased out, or at the very least drop in price.

A perfect case in point is this 8800GT from ASUS, featuring 1024MB of memory – 512MB above the reference design. To help it further stand out from the crowd, this particular model does not follow the NVIDIA reference design at all. It appears to be as far away from reference as possible, in fact, utilising a completely custom PCB, component layout,

memory capacity and cooling method. The only thing keeping this an 8800GT, at least by NVIDIA's books, is the G92 core with 112 stream processors slapped in the middle of it.

While it's great to see innovation, it needs to have purpose. In this case, it appears to be a case of 'because we can' or 'because the others did it' – being ASUS and all, we have a feeling it'd suggest the former rather than the latter.

Having said that, Inno3D, XpertVision and Palit are all among a list of other brands to bring an 8800GT 1GB product to the market, albeit on average \$20 cheaper than the ASUS offering. While \$20 isn't too significant, and for many the brand assurance of owning ASUS or bundled software is often enough to sway an unsure mind, what happens when the competition is broadened?

First and foremost, the 1GB model of the 8800GT will attract competition from the 512MB models as performance differences will be negligible.



This is due to the 256-bit memory bus being a bottleneck for the 1GB models. Secondly, the 9600GT, with an overclocked core of 700MHz and shader of 1750MHz, will return equivalent performance – at least up to 1280 x 1024 resolutions – before the lower stream processor count bottlenecks the subsystem. And the final nail in the coffin, price.

This card comes to market at \$350 yet for \$100 cheaper you can get a 512MB version with comparable performance at resolutions such as 1680 x 1050. Or, if you're gaming at 1280 x 1024, save yourself some further cash – to the tune of \$150 – and get a 9600GT and overclock it.

The 1GB model is priced out of contention – end of story. ☺

**6.5**  
OUT OF 10

	Crysis			3DMark06	3DMark03
	Avg	Min	Max		
1x 8800GT 1024MB	16.55	13.14	19.28	12015	22591
1x 9600GT 512MB @ 700MHz/ 1000MHz/1750MHz	16.61	12.55	18.87	13144	39219

# XFX 9600GT 512MB

## SPECs

Price \$252  
 Supplier XFX  
 Website [www.xfxforce.com](http://www.xfxforce.com)  
 Specifications 650MHz core; 900MHz memory (1800MHz effective); 1625MHz shader; based on 65nm G94 core; 64 stream processors; 512MB GDDR3; dual DVI; single slot active cooling solution; single 6-pin PCIe power connector

XFX has had a strong presence for some time now within the Australian market. Not only that, but it has grown to be a very popular brand within the enthusiast community and at the same time risen to become a top tier partner of NVIDIA's – often being the first to market with reference design products, then following up with overclocked revisions.

We received this sample just before deadline for the last issue; testament to XFX's first-to-market approach. It was beaten only by a sample direct from NVIDIA and branded by Zotac, but it was too late for inclusion in issue 87 and was put aside for

this month. If anything, this has worked in the favour of you, the reader, as this month we have a stock standard reference design (XFX), a non-reference 512MB (Palit) and a non-reference 1024MB (Gainward). This offers a good cross-section of some of the options currently available on the market.

One point to note from the get-go is that the 9600-series is the mid-range, budget-oriented gaming solution for the 9-series. This puts the card in the same area as the 8600GTS from the 8-series.

As many of you know, the 8600-series were a comparative let down after the strong bang for buck value seen in the 6600GT and 7600GT that came prior to it. Thankfully, we can happily say that the 9600GT is a return to old mid-range form, offering strong value for your money.

Sporting clock speeds of 650MHz core, 900MHz memory (1800MHz effective) and 1625MHz shader, this card is your stock standard rebadged reference design.



Coming in at \$252 and only offering reference clocks, XFX is asking a bit much for what other brands provide for \$50 cheaper, however. The performance is solid but for the money spent there are cheaper alternatives. At this point in the game, the Palit simply offers better value and additional HDMI features.

With a goal scored by Palit, the ball's now in XFX's court and we look forward to an overclocked edition in the near future. ☺

45nm Core 2 Quad @ 400x10; DDR3-1800 7-7-7-20 1T

	Crysis			3DMark06	3DMark03
	Avg	Min	Max		
1x 9600GT	13.98	10.40	15.26	11479	34968

**7.5**  
OUT OF 10

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**AMD**  
Smarter Choice

# Gainward Bliss 9600GT 1024MB

## SPECS

**Price** \$291  
**Supplier** Australia IT  
**Website** [www.australiait.com.au](http://www.australiait.com.au)  
**Specifications** 700MHz core; 1000MHz memory (2000MHz effective); 1750MHz shader; based on 65nm G94 core; 64 stream processors; 1024MB GDDR3; dual DVI; HDMI; Display Port; dual slot active cooling solution; single 6-pin PCIe power connector

**A**s much as Gainward and Palit may be associated by manufacturer, the two brands still very much vie for every decimal point share of the market.

Having had the Palit 9600GT 512MB in our labs for a couple weeks we received a phone call from a Gainward rep stating they had a brand new 9600GT card featuring HDMI and display port outputs – we explained we already had a model capable of such feats. Not content with a loss, the rep then presented us with another option; this one was

even newer and even greater (according to him, at least) and featured a whopping 1024MB of memory. Well, it's something different again within the market place so, cool, we accepted a sample.

Having had experience with over-blown RAM-packed cards before, we weren't too hopeful. None the less we kept an open mind and gave it a go.

While, like many things, double the amount of dedicated memory is a good thing in theory, it's not always triumphant in practical execution. With 1024MB of memory squeezed through a 256-bit memory interface, it came as no surprise that there was a memory bottleneck. So much so that, even while featuring stock overclocked frequencies of 700MHz core, 1000MHz memory (double data rate of 2000MHz) and 1750MHz for the shader (spotted the similarities to the Palit yet?), there still wasn't sufficient capability and/or capacity to use brute force to release the bottleneck. Or at least make it appear there was no bottleneck.

Ultimately, unless the bandwidth of the memory



interface can be increased, the extra memory does close to nothing to aid additional performance. Instead, the end result is a product that performs the same, minutely above or slightly behind, its competitor featuring the reference memory capacity – in this case, 512MB.

For the sheer fact that it is an overclocked 9600GT, it does alright for itself. But factor in the additional costs, the uninspiring inclusion of *Tomb Raider: Anniversary* bundled with the card and it becomes obvious that there are simply better options available in the market. 

45nm Core 2 Quad @ 400x10; DDR3-1800 7-7-7-20 1T

	Crysis			3DMark06	3DMark03
	Avg	Min	Max		
1x 9600GT	16.55	12.54	18.93	12305	37415

SCORE

**6.5**  
OUT OF 10

## Palit 9600GT 512MB

## SPECS

**Price** \$214  
**Supplier** BroNet  
**Website** [www.bronet.com.au](http://www.bronet.com.au)  
**Specifications** 700MHz core; 1000MHz memory (2000MHz effective); 1750MHz shader; based on 65nm G94 core; 64 stream processors; 512MB GDDR3; dual DVI; HDMI; Display Port; dual slot active cooling solution; single 6-pin PCIe power connector

**P**alit, a brand that many push aside as 'another of the masses', has been steadily proving itself as a serious player in the enthusiast and realm and this 9600GT 512MB further boosts this image.

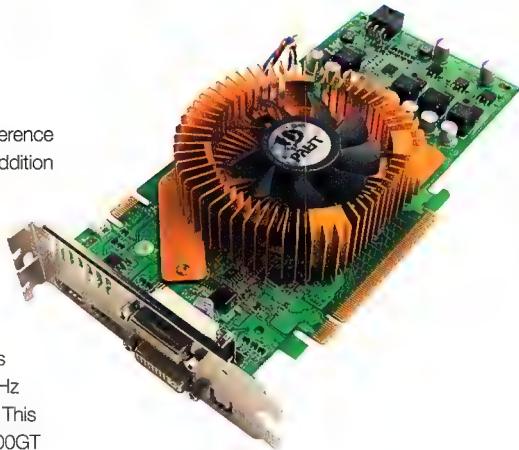
It's not a well known fact, but Palit and Gainward are produced by the same company. Where Gainward is pitched as a premium product brand, Palit is often perceived as pushing the boundaries in terms or form and function.

It comes as no surprise then that not long after receiving the XFX and Zotac reference design samples, we received this non-reference and very

unique card from Palit. Not only is it a non-reference design, featuring a dual slot heatsink, but in addition to the already available two DVI outputs is an HDMI and display port output. This was the first card and indeed first product outside of the Dell contingency that we've seen with a display port connection.

Further distinguishing it, the Palit offering sports non-reference overclocked frequencies of 700MHz core, 1000MHz memory (2000MHz effective) and 1750MHz for the shader clock. This allows the card to perform on par with an 8800GT 512MB and push out some very impressive benchmark results for a budget graphics card. This is certainly reminiscent of the equivalent performance once seen from overclocked 6600GT and 7600GT cards in their time and completely sticks the boot into the 8600GT and 8600GTS.

The 8600-series isn't the only cards this Palit 9600GT 512MB is stickin' it to. These unique features and overclocked speeds, combined with a



competitive price point of \$214, make for one very tasty offering.

Solid performance, overclocked at stock, next-gen video outputs and a very competitive price – what else could an enthusiast on a budget want? These cards are positioned very aggressively within the market place and we hope this spurs more competition between vendors to offer something of as much value as this card. 

45nm Core 2 Quad @ 400x10; DDR3-1800 7-7-7-20 1T

	Crysis			3DMark06	3DMark03
	Avg	Min	Max		
1x 9600GT	16.61	12.55	18.87	13144	39219

SCORE

**8.5**  
OUT OF 10

## SPEC

Price \$420  
 Supplier Kingston  
 Website [www.kingston.com](http://www.kingston.com)  
 Specifications DDR3-1625; 7-7-7-20; PC3-13000; 1.9v operating voltage; Micron D9 ICs; 2x 1GB kit; 240-pin DIMM; Non-ECC; Unbuffered DDR3; lifetime warranty.

In last month's memory roundup the Kingston representative, the HyperX DDR3-1375 C7 kit, while good when DDR3 launched, suffered poorly.

Not only did it get its Elpida IC-based butt handed to it by the large majority of the market that either jumped straight to Micron ICs from the previous Elpida based kits or waited for Micron to release a DDR3 IC, the poor little HyperX was stuck with a high

price tag to boot.

Since then, Kingston has released this DDR3-1625 7-7-7-20 kit based on, you guessed it, Micron ICs. Now capable of keeping up with the rest of the competition, Kingston is back in the game.

The kit was tested in the NVIDIA 790i Ultra SLI motherboard and we took full advantage of the asynchronous ('unlinked' in the BIOS) memory overclocking capability. Doing so, we set our 45nm Core 2 Quad to run on a 400MHz FSB and locked the multiplier at 8x to give us an end frequency of 3.2GHz.

As would be expected, the kit ran through the benchmarks with flawless results. Furthermore, we were able to tighten all of the alpha timings except the CAS latency. Additionally all testing was achieved



with the swiftness of 1T-based latencies.

Unfortunately, to operate at C6-based timings with DDR3-1600 frequencies, the modules required more voltage than the 2.0v (vdroop to 1.96v) available on the reference 790i Ultra SLI platform.

Following up these stock and tweaked results was some further high-frequency testing. Again the kit performed with prowess and ran through the tests at DDR3-1800 7-7-7-20 1T with no issues. We eased off the latencies a little further to 8-8-8-22 1T and managed a powerful DDR3-2000 frequency!

It's great to see Kingston bringing a competitive product to market, and with announcements of a DDR3-1800 kit to hit the market by the time you read this, we could be seeing a past powerhouse coming back into the performance arena. 

**SCORE** **9.0** OUT OF 10

	406x8; DDR3-1625 7-7-7-20 1T	406x8; DDR3-1625 7-6-6-18 1T	400x8; DDR3-1800 7-7-7-20 1T	400x8; DDR3-2000 8-8-8-22 1T	457x7; DDR3-1996 8-8-8-22 1T
Super Pi 4M	1m 17.390s	1m 17.422s	1m 18.328s	1m 18.406s	1m 17.969
wPrime 32M	13.328s	13.234s	13.625s	13.624s	13.640s
Hexus Pi Fast	28.17s	28.11s	28.47s	28.55s	28.38s
Everest read	11681MB/s	11743MB/s	11528MB/s	11354MB/s	12261MB/s
Everest write	8664MB/s	8664MB/s	8530MB/s	8530MB/s	9753MB/s
Everest latency	52.8ns	48.9ns	48.0ns	50.9ns	49.4ns

## Point of View 8800GTS 512MB

## SPEC

Price \$TBA  
 Supplier Australia IT  
 Website [www.australiait.com.au](http://www.australiait.com.au)  
 Specifications 650MHz core; 970MHz memory (1940MHz effective); 1625MHz shader; based on G92 core; 128 stream pipelines; 512MB GDDR3; dual slot active cooling solution; single 6-pin PCIe power connector

This month has seen a lot of shuffling and bustling within the NVIDIA hierarchy.

Like any new release, what kind of new arrival would it be if there wasn't at least a hint of controversy to meet it – pretty boring we reckon. Not being one to disappoint, the arrival of the 9-series has seen forums light up with a mixture of delighted and distraught reactions.

45nm Core 2 Quad @ 400x10; DDR3-1800 7-7-7-20 1T

	Crysis			3DMark06	3DMark03
	Avg	Min	Max		
1x 9800GTX 512MB	22.95	17.89	26.09	14973	43278
1x 9800GX2 1024MB	38.77	25.87	44.28	19788	64499
1x 8800GTS 512MB	20.32	15.51	23.35	14176	41583
2x 8800GTS 512MB	31.74	21.58	40.68	20009	68217
1x 8800GTX 768MB	20.71	13.98	23.54	13953	43238

On the one hand the 9600GT blasted out of the blocks, simply decimating the 8600-series cards and rightfully taking its crown as the budget top dog for NVIDIA. But with the top of the line, high-end, 9800-series cards there's a bit of confusion.

For starters, the core used – G92 – is the same as is used in the older 8800GTS 512MB, only the core, memory and shaders have been given tweaks up or down to suit the implementation. For the past three generational leaps we've seen on average a two fold increase in performance, however this generational baton exchange is akin to the 7800-series to 7900-series change over rather than the 7900-series to 8800-series change. Therefore, this alone has let individuals down and left many thinking the wait was not worth it.

To put the final nail into the coffin, when the



numbers are run it becomes ever so glaringly obvious that the 9800GX2 is simply two lower clocked 8800GTS 512MB strapped together in SLI and the 9800GTX an overclocked impression of the 8800GTS 512MB, yet both demand a price premium above the 8800GTS 512MB for some absurd reason.

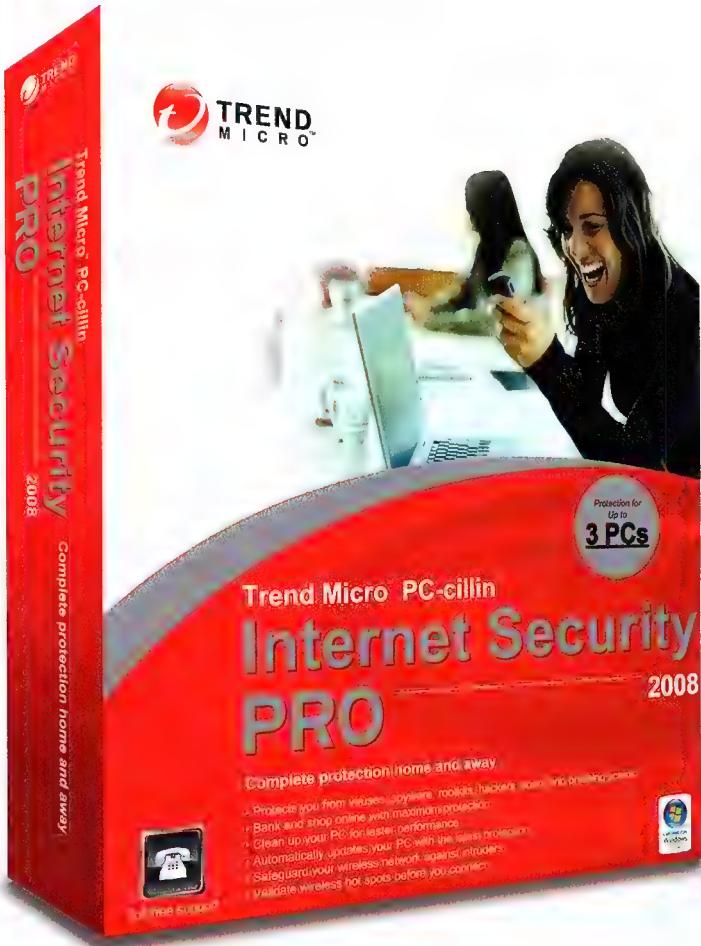
The Point of View 8800GTS 512MB provides a solid card that uses the reference design and clock speeds. In comparison to the inflated price of the 9800GTX and 9800GX2, one or two of these 8800GTS 512MB cards will provide a better value solution for your gaming experience. 

**SCORE** **7.5** OUT OF 10



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# Auzentech X-Fi Prelude 7.1

Jake Carroll puts Auzentech's latest through its paces, and finds some interesting results.

## SPECS

Price \$319

Supplier Auzentech

Website [www.azentech.com](http://www.azentech.com)

**P**roduct differentiation is critical in the soundcard market. The Auzen Prelude 7.1 is indeed different. The card uses a Creative CA20K X-Fi SPU but everything else is modified, including high end Asahi-Kasei AK-5394/5396 series ADC/DAC converters used for 24bit I/O. These ADC/DAC units are much more robust than the standard Creative fare.

The overall package is different too, with only the PCI card found in the box. You won't find any accessories such as cables or 'linky bits'. Another interesting differentiator is the savagely bright LED beaming from the back of the SPDIF link. While having an active function, it also looks impressive, for those that care for aesthetics in PCI devices. Then there is the inclusion of swappable OPAMP's (Operational Amplifiers) from Texas Instruments. The idea here is that users can upgrade to higher quality OPAMP's to attain a

more refined signal or a specific sound. For example, the OPA-627AU component offers a warm, rounded sound, whereas the OPA-637AU is more suited to high resolution, high dynamic range music. Consider it overclocking for audiophiles.

## Testing the Auzen X-Fi

We employed RightMark's Audio Analyser for metric generation. For qualitative testing, we used a 3m square carpeted room and 16bit, 24bit and 32bit audio content:

- 16bit, 44.1kHz: Cog 'The New Normal' [CD Audio]
- 24bit, 96kHz: Columbia Pictures 'Hellboy' Blu-Ray DVD [BD PCM Audio]
- 32bit, 192kHz: Biped Productions 'Gust of Gravity, In Superposition' [ProTools Audio]

We used two sets of enclosures:

- Altec Lansing 621's
- Tanoy Reveal 6D monitors

Test	Auzen X-Fi Prelude 7.1 @ 16bit, 44.1kHz	Auzen X-Fi Prelude 7.1 @ 24bit, 96kHz	Auzen X-Fi Prelude 7.1 @ 32bit, 192kHz
Frequency response (from 40 Hz to 15 kHz), dB:	+0.15, -0.09	+0.12, -0.10	+0.11, -0.10
Noise level, dB (A):	-92.9	-96.5	-96.4
Dynamic range, dB (A):	92.8	96.4	96.5
THD, %:	0.095	0.001	0.0011
IMD + Noise, %:	0.207	0.349	0.252
Stereo crosstalk, dB:	-85.7	-84.9	-84.7

Table 1.0 - Auzen X-Fi Prelude 7.1 loopback results

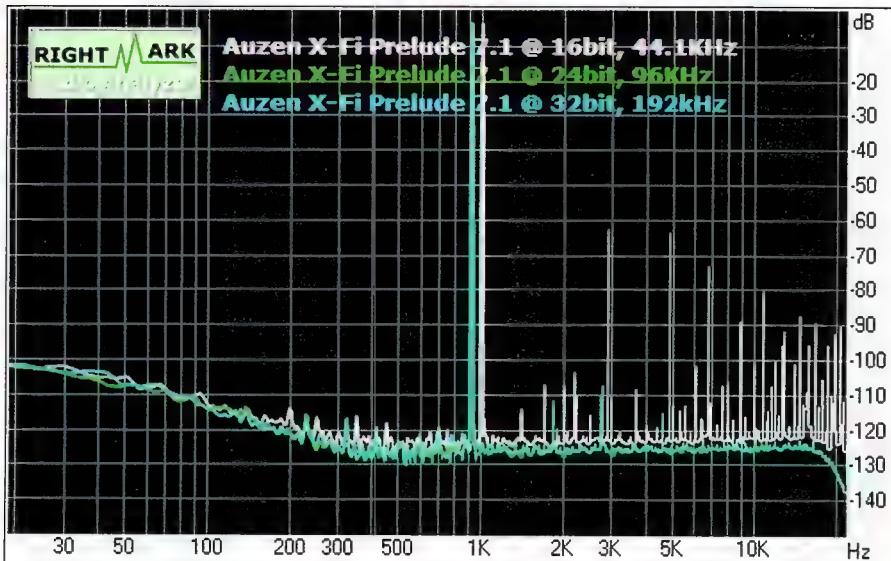


Figure 1.0 - THD (16bit, 24bit, 32bit @ -3dB FS)



SCORE **9.0** OUT OF 10



atomic

# Dell 3008 WFP

**David Field finds a lot to like about Dell's latest epic-big screen.**

## SPECS

Price \$2299  
 Supplier Dell  
 Website [www.dell.com.au](http://www.dell.com.au)  
 Specifications 2560 x 1600; S-IPS panel;  
 WCCFL backlight; 2x DVI-D, VGA, HDMI,  
 Display Port, composite, S-video and  
 component inputs; audio output from HDMI.

**D**ell was the first company to hit us with an epic 30in screen back in the day when they were new and shiny. It was awesome in almost every way, except that unlike some smaller screens, the 30-inchers only had a single dual link DVI input and no real controls.

We saw the same thing happen on all the other 30in panels and talked to some engineers at HP; we discovered the problem was that behind the panel there was only just enough electronics to display images. This explained why early models had brightness controls that could only dim the backlight, and a dual link DVI input.

The height of the 30in world was HP's LP3065, a model with an input selector that would switch between one of three DVI inputs. Cool, but essentially a glorified inbuilt KVM without the K or M. What was needed was scaling electronics that could drive other signals into the 30in panels – and electronics that could deal with the 30in crowd's better than HD resolution didn't exist.

Until now.

Here she is. This is Dell's new 30in display, which comes complete with almost every input in the world. There's two DVI-D inputs as well as VGA. You get every useful analogue input available: one each of composite, component and S-video. There's also HDMI and even the strange and similar Display Port. In fact the only inputs that aren't here are professional ones, like HD-SDI, that 0.01 per cent of people would find useful. It shares the bezel styling and menu structure of its smaller 27in cousin, the 2707WFP. If you ask us, the new 3008 looks better than the old model. More importantly, the new rotating arm it sits on swings and pivots into more positions than the older model. Not as high, perhaps, but having a whole extra axis to play with certainly helps.

The menu system lets you enable picture-beside-picture mode, which gives you two 4:3 frames next to each other. The left side can display one of the following: component, VGA or Display Port, while the other can display either one of the DVI connectors, composite, S-video or HDMI. Sadly this system does limit some of your options: you can't, for example, split-screen two computers both connected through DVI.

The 3008 is powered by an S-IPS panel, and its WCCFL backlight gives it a wide gamut of white to filter. As well as custom settings that show its consumer heritage (there is no black level setting or other more advanced options) it comes with

Adobe RGB and sRGB presets as well as the kind-of-pointless warm and cool options. You can also do the adjustment through the video card with DCC/CI.

Overall performance is generally very good, and you simply can't beat the immersion factor of playing on a 30in monitor (before getting silly with curved concept displays). 1080p content looks beautiful, and if you want to smile and bask in the glory of your dWang (Display Wang) you can always switch to 1:1 aspect ratio and watch 1080p content in the centre of the frame surrounded by a fair bit of black.

The scaling is great from high resolution sources, but lower resolutions (especially interlaced low resolutions – we're looking at you, composite) don't fare as well. But at least you do get the video sources. And even though it's not a good idea, it's nice to know you can now run the 3008 with a single link DVI cable from your PC.

We did run into a few problems though.

The sample we had suffered from a bleeding backlight. When displaying a pure black signal, a small area at the top left of the screen was noticeably brighter than the rest of the screen. And there was a similar but bigger bleed problem in bottom right hand corner.

Although our Display Mate colourimetry tests were quite well balanced (even on the default settings) the panel had some trouble reaching for deep blacks without crunching out. It got better, at the expense of its top end white values, as we



cranked it up to a retina-cooking full brightness.

The industry standard *Guitar Hero* lag calibration test confirmed that the analogue video inputs have about 100ms of input lag. Although your audio will hit you a touch before your video, 100ms is a better result than a lot of other monitors we've seen through the labs. Most of the time your brain will do the smoothing for you; you shouldn't notice the gap. Unless, like us, you're a bit of a pedant – in which case you might.

For most people, however, these little foibles are far outweighed by the sheer scale and versatility of the thing. And to illustrate the versatility point, there are even three 3.5mm outputs for sending analogue surround sound to amplified speakers straight from the monitor. The audio from the HDMI input is decoded in the monitor and can be output as stereo or surround from within the monitor's menu. Brilliant.

It's not perfect, but for all intents and purposes it is the new display God. 

**SCORE** **9.5** **OUT OF 10**





# Hey, look it's... the same. \*groan\*

**Josh Collins is getting jaded. Is there anything to be done?**

For the past 18 to 24 months we've been floating around in an oasis of new tech. This tech has literally been taking leaps and bounds. Take a look at DDR3 memory if you don't believe me. Ten months ago it was crawling along at DDR3-1066 C6, now it's flying along at DDR3-2000 C8 – now that is fast development!

The problem in this little paradise occurs when we, the ever needy, ever wanting, ever new-born-like, crave for continuous leaps in generation-split computing power. But can we really be the ones to blame?

With every new product release, vendors announce that their new hardware is growing ever mightier, gaining an ever more glorious aura and far exceeding what we expected out of hardware a generation ago. So naturally, we've become accustomed to expecting revolutionary advances with each new release.

We've been conditioned to yearn for the two-fold increase in performance more than any other new feature come new release time. And yes, sometimes "two-fold increase in performance" is a bit optimistic. But by the same token, we're not stupid. You're not stupid. I'm not stupid.

So why the hell do manufacturers try to feed us the same silicon twice? Any pub crawler will tell you that things are never as enjoyable the second time around, no matter how good they were the first time. So why do this to us?

Over the last few months I feel like I've been force fed, and swallowed, the same tech from three to six months ago. All the while a flashy dance is put on to herald what vendors believe to be the second coming.

Well I'll tell you, it is and has been the second coming. But not of the almighty embodied within your second-time-around product. Oh no. Just the same tech all over again and only if we're lucky will it have a new bell or whistle. But rarely both.

All is well and good. I've had a rant, but where's the proof for this cry for new and interesting tech? Well, let's take a moment and just look at the new releases recently.

Intel hasn't even officially launched the X48, but it's been such a long time coming that manufacturers are making boards with it anyway. And it's no big

deal either, because X48 is just an X38 with a big ol' +1 in the tens column.

We want new tech, not just a numerical upgrade in the model number.

They say it's a cherry picked X38 northbridge but from my experience with a large slather of motherboards, I've had just as many X38 boards out perform X48 as I have had the opposite. Not only that, but Intel feels it's right to charge manufacturers \$US20 more than an X38 for the privilege of a higher product number. For us, this means a price hike for no performance gain.

With this kind of behaviour from Intel, we can call ASUS downright lazy. Its P5E, Maximus Formula and Rampage Formula are all essentially the same. The \$200 X38-based P5E can be flashed to a \$350 Maximus Formula, and then to the \$450, yet to be released, X48-based Rampage Formula!

But it doesn't stop there. How about the 780i? The only difference for the end user is 45nm quad core support, because Intel coincidentally screwed over NVIDIA with its 680i plans and the inclusion of nForce200 bridge chip for three PCIe slots running the full 16x electrical transfer speed. These are valid introductions but the

hoo-hah surrounding the release was all a little over the top.

To round out the recent second servings is the G92 graphics core. Initially hailed a performance-on-a-shoestring saint, it has now returned to take evil advantage of our wallets, kill kittens, make baby Jebus cry and resurrect itself as a value killer.

It's not often I get tired of new releases. After all, they do tend to keep me in a job. But once the novelty has worn off, and the market appears to be doing circles rather than progressive strides forwards, I can't help but to vent the frustration.

Viva La New Releases!

Once a man is sick of new releases, the end cannot be far away. Give Josh some hope...

[jcollins@atomicmpc.com.au](mailto:jcollins@atomicmpc.com.au)



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# Welcome to super-surveillance

**Daniel Rutter is watching you. But who is watching Daniel Rutter?**

Security cameras may be sprouting all over the place, but anybody who's briefly glanced at their actual output knows that the vast majority of them are low-resolution, low-frame-rate devices that're almost useless for identification purposes.

And most cameras are 'dumb'. They may not even be feeding a half-hour tape loop, and it's practically a cliché that local councils are happy to win votes with 'security' cameras, but don't necessarily feel any need to waste more ratepayers' money on someone to actually watch the screens.

The nonsensical things people do with security camera video in TV crime shows may, however, not stay nonsensical for long. And soon, the cameras won't even need someone there to say "Enhance!".

There's no technical reason why a device the size and shape of a normal security camera couldn't capture high-gain 30-frame-per-second video with ten-megapixel resolution. Or more.

The laws of physics do stand in the way of some of the more terrifying surveillance possibilities I've seen people talking about. A surveillance camera with a lens of normal size will, for instance, probably never be able to ID you by iris pattern if you don't stand within spitting distance of it.

But a video-speed stream of images as good as you can take today with a DSLR with a \$500 telephoto? That's going to happen, whether we like it or not.

At the moment, cameras that can do this are so valuable that putting one up on a pole in a car park without its own dedicated armed guard would be idiotic. But that can, and will, change.

The key technology for video 'super-surveillance', though, isn't the cameras. It's software – 'artificial intelligence', if you must – that can understand camera video without human intervention. Not just identifying 'suspicious' acts, but tracking people and vehicles no matter what they seem to be doing.

That kind of software is a growth industry. Just look at the highway cameras that read truck license plates to identify drivers who're speeding or not taking required breaks.

(Around this point, someone usually pipes up to say "If you aren't doing anything wrong, what do you have to hide?" The short answer is "Plenty, you

idiot"; for the long answer, check out Bruce Schneier's site, <http://tinyurl.com/pfv3s>)

There are already a few technologies on the horizon for one or another kind of high-speed reconfigurable lens, that can be zoomed and focussed – and in some cases even aimed – almost instantly. Such lenses can be made from some sort of electro-sensitive fluid, or be the optical equivalent of a software radio – a device that sucks in more or less every photon it can find, then leaves heavy-duty digital signal processing hardware to construct images from the result.

These sorts of devices – or more primitive systems that just have two or three cameras with different specialities all built into one module – can do rather remarkable things when put under advanced software control.

Ubiquitous super-camera systems could, for instance, easily track what books and newspapers you read in public, and even what page or article you're looking at. They could track what you wear, and when. Dress too warmly in summer and you might be a terrorist. Or perhaps just a junkie. Better send the boys 'round, either way.

It's not even impossible that future camera systems may be able to read your lips, like HAL. Software that can do exactly that with high-quality video – often made to help deaf people – already exists.

Before you know it, this technology, plus good enough cameras, could bring the same super-sensitivity to 'terrorist words' that already exists in airports to... well, just about everywhere.

And you'd better believe the cameras will all start paying more attention to you if you start staring back at them.

If our governments make us just a little bit 'safer', there'll be no way to tell paranoid schizophrenics from everyone else.

Dan's not paranoid, just hyper-aware of his surroundings.  
[dan@atomicmpc.com.au](mailto:dan@atomicmpc.com.au)

“ And you better believe that the cameras will start paying more attention to you... ”



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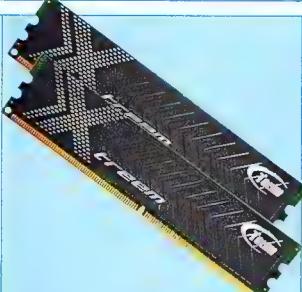
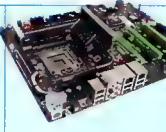
# ATOMIC KITLOG

Our choice for  
the best gear the  
land has to offer

There's nothing sexier than new kit. And whether you need to horde your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and

a collection of sports cars (Extreme), we're here to help with this handy matrix of *Atomic* recommended products. You may find your needs fall between categories – that's okay,

just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in *Atomic*, so if you want to learn more, look up the issue and page number listed.

	CPUs	Motherboards	Memory	Video cards
<b>BUDGET</b> <i>I can't afford to eat, gimme gear!</i>	 <b>Intel Core 2 Duo</b> PRICE \$100-\$480 <p>Stretch a little further and buy yourself a Core 2 Duo – you'll be thanking yourself later. The E4600 is the cheap ticket to speed, at \$165.</p>	 <b>GIGABYTE GA-G33M-DS2R</b> PRICE: \$132 <p>Using the G33 northbridge and has overclocking performance like its full ATX brethren, this Micro-ATX offering is extraordinarily hard to pass up.</p> <p>Reviewed in Issue 81 – Page 52</p>	 <b>TEAM Xtreem Dark PC2-6400 C4</b> PRICE \$95 <p>Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.</p> <p>Reviewed in Issue 80 – Page 56</p>	 <b>GeForce 9600GT 512mb</b> PRICE \$372 <p>It's simple, it's black, and pumps out some pretty pleasing pixels for a very reasonable asking price. So far, easily the best of the 9-series.</p> <p>Reviewed in Issue 87 – Page 43</p>
	 <b>AMD Athlon 64 AM2 X2</b> PRICE \$135-335 <p>Cheap CPUs are a wonderful thing, and the X2s are now wonderfully cheap. The 3600+ is your budget baby at about \$85.</p>	 <b>MSI K9N Neo F</b> PRICE \$113 <p>Excellent performance from a budget board, with plenty of legacy slots for upgraders. Don't expect to overclock though.</p> <p>Reviewed in Issue 68 – Page 33</p>		
<b>PERFORMANCE</b> <i>Hardware that bangs the best for buck.</i>	 <b>Intel Core 2 Quad</b> PRICE \$300-680 <p>Core 2 Quad – a processing powerhouse, now affordable and overclockable like buggery. The Q6600 is the best buy, at about \$336.</p>	 <b>Foxconn P35 Mars</b> PRICE \$236 <p>A great board for the enthusiast with a mess of great ideas and good overclocking potential.</p> <p>Reviewed in Issue 85 – Page 48</p>	 <b>TEAM Xtreem Dark PC2-6400 C4</b> PRICE \$95 <p>Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.</p> <p>Reviewed in Issue 80 – Page 56</p>	 <b>GeForce 8800GTS 512MB</b> PRICE \$413 <p>The 8800GTS manages to outperform both the 8800GTX and the ATI HD3870, which is no mean feat, and manages it at a fair price. Tasty.</p> <p>Reviewed in Issue 87 – Page 49</p>
	 <b>AMD Athlon 64 AM2 X2</b> PRICE \$135-335 <p>The X2 series are still fantastic chips, and in the face of the Intel threat are now going for cheap. The 6000+ is your current sweet spot at about \$235.</p>	 <b>Gigabyte GA-M59SLI-S5</b> PRICE \$250 <p>Gigabyte delivers yet another affordable, feature-filled wonder of the 21st century.</p> <p>Reviewed in Issue 66 – Page 39</p>		
<b>EXTREME</b> <i>Climme power. Money is no object.</i>	 <b>Intel Core 2 Extreme QX9775</b> PRICE \$TBC <p>The cream of the overclocking crop, based on the new New Yorkfield architecture. Truly, Lord of the CPUs.</p>	 <b>XFX 790i Ultra SLI</b> PRICE \$555 <p>It's an imposing board that offers a host of enthusiast options, performance tweaks. We like.</p> <p>Reviewed in Issue 88 – Page 40</p>	 <b>Corsair Dominator</b> PRICE \$777 <p>All up one of the most powerful and versatile kits we've seen.</p> <p>Reviewed in Issue 87 – Page 36</p>	 <b>XFX 9800GX2</b> PRICE \$872x2 <p>Reviewed in Issue 88 – Page 50</p>
	 <b>AMD Athlon 64 FX-62</b> PRICE \$1072 <p>Sadly gets beaten by a mid range Core 2 Duo, but still the top of AMD's pile.</p>	 <b>ASUS M3A32-MVP Deluxe</b> PRICE \$317 <p>True perfection in a mobo form. Very well laid out and overclockable to boot.</p> <p>Reviewed in Issue 85 – Page 51</p>	 <b>Corsair Dominator TwinX 10,000</b> PRICE \$1016 <p>Crazy speed sticks that will also happily do 1T/800MHz/3-3-3-3. Comes with a fan attachment to keep things cool!</p> <p>Reviewed in Issue 77 – Page 58</p>	 <b>Powercolor HD3870X2</b> PRICE \$572x2 <p>Reviewed in Issue 87 – Page 44</p>

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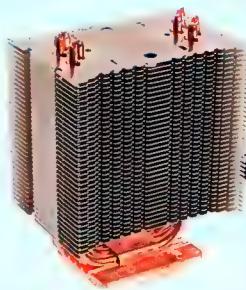
## Coolers

## System drives

## Displays

## Speakers

## Cases

**Noctua NH-U9F**

PRICE \$80

It may only be 90mm, but its cooling power is exemplary, coming in only slightly behind its 120mm brother.

Reviewed in Issue 72 – Page 42

**Samsung HD160JJ 160GB**

PRICE \$68

Super quiet and yet still fast, the 160GB Samsung offers excellent value for money.

Reviewed in Issue 69 – Page 40

**Samsung 931C**

PRICE \$323

2ms of raging colour gamuts and beautifully smooth tonality that will make you weep with joy and hug strangers.

Reviewed in Issue 70 – Page 56

**SteelSound 5Hv2**

PRICE \$120

Awesome gaming audio performance on a shoestring budget. Phenomenal 'phones.

Reviewed in Issue 73 – Page 43

**Lian Li PC-7S**

PRICE \$125

Quality, elegance, refinement and style. The trademarks of a Lian Li case, now available at an entry-level price.

Reviewed in Issue 79 – Page 46

**Thermalright Ultra 120**

PRICE \$75

Tower cooling that will keep your tower cool. Whack a Nexus 120mm fan on for near silent cooling.

Reviewed in Issue 72 – Page 42

**Seagate Barracuda 7200.10 320GB**

PRICE \$95

Seagate's fancy new technology makes this beast both fat and fast. Mmm, toasty.

Reviewed in Issue 69 – Page 40

**Samsung 244T**

PRICE \$999

Brilliance at 24", the 244T offers 6ms gaming, a wonderful gamut and more inputs than an alien hooker.

Reviewed in Issue 69 – Page 48

**AVLabs AVL325**

PRICE \$165

While it can't hold a candle to the Z-5500D, with a price this low there's no excuse not to jump to 5.1.

Reviewed in Issue 64 – Page 50

**Cooler Master Stacker 830**

PRICE \$285

Like the Stacker before it, this sensational Stacker stacks sumptuous specifications salaciously.

Reviewed in Issue 61 – Page 36

**Asetek Vapochill Lightspeed**

PRICE \$1020

Vapour phase change. Ooooh. Vapour. Phase. Change. No matter how many times you say it, it's still cool (pun!).

Reviewed in Issue 64 – Page 38

**Western Digital Raptor WD1500ADFD**

PRICE \$264x2

Dear lord. The performance king hath cometh, short of whacking in a SCSI. Buy two and RAID 'em.

Reviewed in Issue 62 – Page 40

**Hewlett Packard LP3065**

PRICE \$2109

Thirty inches, 2560 x 1600, 8ms G2G. If you can handle the size and cost to run this massive beauty, you won't be disappointed.

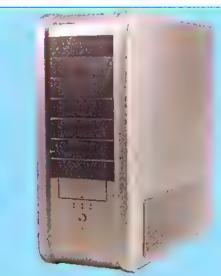
Reviewed in Issue 76 – Page 53

**Logitech Z-5500D**

PRICE \$363

Able to play the 'liquid gold' that is DTS 96KHz/24-bit, this 5.1 beast can wreck both home and hearing alike with equal impunity.

Reviewed in Issue 48 – Page 56

**Silverstone TJ07**

PRICE \$348

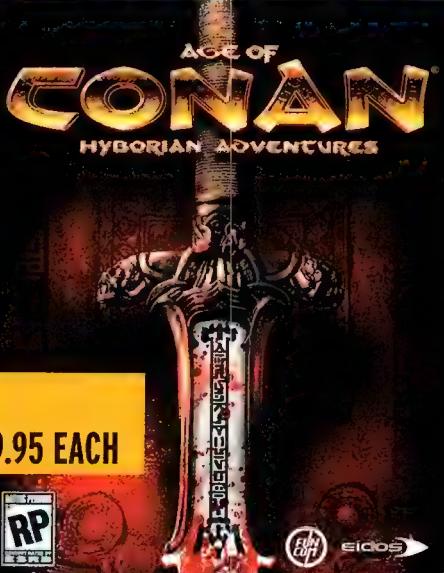
The Silverstone Temjin TJ07 is a huge hulking beast that shows you mean business in the finest style. Impeccable finish and plenty of room means win.

Reviewed in Issue 65 – Page 49

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# GAMEPLAY

GAMES, GAMING AND GAMERS COVERED ATOMIC-STYLE

It's a strategy gamer's dream run this month, with titles ranging from the depths of space to ancient Rome to whet your real time and city-building appetites!

First up is our first look at the upcoming *Dawn of War 2* – we got to visit Relic's offices in Vancouver to get the lowdown in this title, and we've got an exclusive look at the gameplay and design ethos behind the new title.

That's a while off, though, so if you want some space borne action, we've

reviewed the sleeper hit *Sins of a Solar Empire*. If grand space action is your thing, this is your game. *Imperium Romanum* takes back a step, and offers a more leisurely strategic challenge.

And togas. Gotta love togas.

Finally, we've got a couple of new anime releases to whet your animated appetite. Enjoy!



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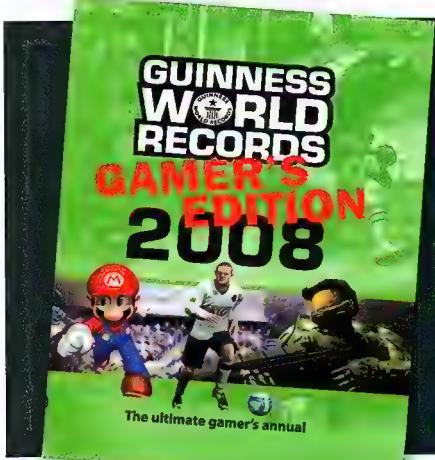
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# The Dawn of a new War

**David Hollingworth** recently spent some time at Relic Studios in Vancouver, catching up with the dark future of humanity.

**D**awn of War was a revelation for both RTS gamers and fans of the Warhammer 40,000 universe alike. For the former, *DoW* provided a refreshing take on every aspect of the RTS genre, from base-building to resource management and gathering. For the latter, it was finally a 40k game that fans could be proud of, that really articulated the violent darkness of the most popular tabletop wargame on the planet.

The 40k setting was nothing new to PC gamers at this stage, but to say the franchise lacked any real pedigree is a bit of an understatement. From *Chaos Gate* and *Final Liberation* up to the tragic FPS *Fire Warrior*, 40k games simply lacked that vital spark that separated adequate games from even just plain

good ones. *Dawn of War* finally showed what the setting could offer, and now, Relic Studios is four months into building the sequel.

“*Dawn of War* revolved around three concepts – brutal hand to hand combat, over the top units, and action. With *Dawn of War 2*, we’re dialling all those up to 11,” says Jonny Ebbert, lead designer on the title. “The original also had all this base-building, but who wants to do that? We’re planning on making the new game much more like the tabletop version, where you can just get into the action right away.”

He’s not kidding, either. Every aspect of the game, from the graphics to the power level of your units, has been ramped up to epic levels. In the gameplay demo we saw, once the action starts it’s pretty much non-stop, and it starts the minute your marines set foot on a planet. No bases to build, no weak starting units to make those initial missions boring.

The game is in early days just yet, and we won’t be seeing it shipping this year, but the basics of the game are already solid. Whereas the first game’s single player campaign was quite linear, with little carry-over of units from battle to battle, *DoW2* features a rich and multi-layered campaign. An entire Sector of the Imperium is under threat, and it’s up to your small detachment of Space Marines – the genetic super warriors of the 40k universe – to save it, and perhaps all of humanity.

## We happy few

“We felt that the RTS genre lacks real long term gameplay goals. You lack attachment to your troops; you carry nothing with you from one game to the next,” Jonny says. “We want to give players a steady stream of rewards, as well as attachment





The battlefields in *DoW2* will be far less flat than its predecessor. There'll be bridges and high buildings to exploit.

to and ownership of their elite troops."

If some elements of the gameplay sound familiar, it's with good reason. Relic has taken a lot of cues from the success of another of its Game of the Year grade strategy titles – *Company of Heroes*, which itself was directly informed by the first *Dawn of War*.

"Whenever you played *CoH* you'd hear your squads call out to each other, often by name, and when a named character died, it was a real moment," says the game's producer, Mark Noseworthy. "For *DoW2* we wanted *CoH*-style simple missions, with simple objectives, with low unit counts, and to deliver an intimate experience. *DoW2* is based around controlling an elite company of five or six units that you take to the end of the campaign."

To that end, gone are the faceless squads and units of the original. Every squad leader now has a name and personality, and a face for players to get attached to. We asked how unit loss would be dealt with, but an eloquent shrug from Jonny suggested that that was an issue the designers were still tackling.

Mark then went on to talk up the elite nature of the warriors under your command – the finest soldiers the world has ever seen, bred for war and part of a dying breed. There is a quote from the table top game that came to mind as Mark and Jonny delivered their vision for the game – "There is less than one Space Marine for every planet in the Imperium of Man; and yet, they are enough." It's a quote that, even if the devs are unaware of it, seems to have been taken to heart.

"It's like the movie 300, right?" Mark says, "But Space Marines are so bad ass that it would just be called 30."

## There is only war

While Relic's staying mum when it comes to the game's multiplayer element, the campaign structure is already in place. The first game's campaign was quite linear; each expansion added on a more abstract strategic layer, allowing players to fight over continents and regions of a planetary surface, but it still seemed like a tacked on way to make the





41st millennium warfare in all its brutal glory.

campaigns more 'interactive'.

*DoW2*'s campaign is much vaster in scope, which also ties back into Relic's efforts to make your squads and units cherished comrades rather than disposable grunts.

Your Marines start play aboard an Imperial battleship, which has been tasked to clean up this as yet un-named sector. However, the order in which you approach the missions, sub-missions and planets is very open. Once you approach a planet, you can respond to any number of distress calls from the surface, and then drop your troops into action. In the demo, there were three such distress calls, each with a different style of mission – and mission reward. More on that later.

However, you only have a limited time to complete each mission, so the order in which you take on each challenge will limit what else you can do. Do you drop into an urban combat zone to take out a rampaging Ork warboss, or do you reinforce Marine colleagues beleaguered by an overwhelming attack? How this kind of semi-branching mission structure will hook into the larger plot remains to be seen, but it was hinted that there'll

“ The detail has been beefed up to take advantage of the Essence engine. ”

be far more than one ending. "There's a difference between winning and having three citizens and a dog left, and winning and having most of the sector intact," says Mark.

As we said, each mission offers up unique rewards – epic weapons and wargear with which you can customise your characters and squads. In a move that shares more than a few similarities with the MMO scene, random wargear will even drop from certain badguys as you slice, shoot or annihilate them. "We've taken the library of the 40k universe and really ramped it up," Jonny says. "Items come from mission completion, as well as dropping on the battlefield. It's all about creating a one-more-minute gameplay experience," adds Noseworthy. In the next section of the demo we saw a Marine Commander, with a warhammer bigger than God, smashing five kinds of shit out of a warboss, and we believe every word the devs have to say about customising your troops.

## Engines of destruction

Of course all the innovation in the world won't help if the game looks like crap, but that's not a problem *DoW2*'s going to suffer. The detail in the settings and character models has been beefed up to take advantage of the Essence Engine, and the environment is fully in sync with the Havok physics engine. But what does this mean for gameplay?

Well, here's a short description of one part of the demo we





saw: your squad is pinned down by advancing Orks. They can't push you out of cover, but there are too many of them to overcome. The air is full of the vapour trails from rocket-powered bolt rounds from your Marines' bolters, and shell casings fall and tinkle over the stony ground. Then, with a scream of jump jets the cavalry arrives – Assault Marines drop in amongst the Orks, their jets scattering them amongst the rubble, their chainswords hewing them down in swathes of blood and gore. As the assault intensifies, rockets fire, flames roar, buildings collapse, and bodies are strewn about the ruins. Or, as we wrote in our notes on the day: "Physics + destructible environments + flamers = WIN."

Of course, adapting the mechanics of *Company of Heroes* into a world where close combat is the ultimate arbiter of victory presented some serious challenges to the programmers.

"Our biggest challenge is pathfinding. *CoH* was all about destructible environments and ranged combat; but melee really changes that," says Jeff Hill, one of the project's programmers. "You get a large unit and small units fighting hand to hand, and you end up with some really odd pathing."

Pathfinding of course feeds into unit AI, and Relic is doing its best to imbue units with some hefty thinking power. "We're trying to make units intelligent, in the way they search for cover, set up weapons, or even where they aim while they walk in a squad," he went on to say, "choosing intelligent points to watch and cover each other."

But for each advance in squad AI and environmental physics, comes a new challenge. "Intelligence is a difficult problem," Jeff said with a sigh. "There are a lot of numerical issues with how a unit works out what is good cover and not. Make the numbers too loose and a unit will cross the map to hunker down at the best cover, or a unit can constantly get caught moving from one wall to another, setting up their weapons, and then deciding that the first wall was best."

But there have also been some elegant solutions to be found in the new approach. Knock-back in *CoH* was purely physics-based, but since 40k is so much more over the top, the programmers have had to code in new parameters for knock back that can be applied on a per weapon basis, and with variables covering height, speed and distance of ground covered. Not only does this make for cool explosions and unique effects for each weapon, but in one instance in the demo, when a ship in orbit fired on the surface to annihilate a whole bunch of Orks, nearby greenskins floated into the air as if gravity itself were being ruptured, and then were blasted away – something the programmers had never even envisioned when they gave the new knock-back code over to the designers.

## The final countdown

We're very happy that Relic's not resting on its laurels and producing a cookie cutter sequel just to cash in on the franchise. There's some serious thought and reflection on not only what it means to be a Warhammer 40k game, but what it means to be a modern RTS as well.

If the same effort's put into balancing the game's multiplayer – and the only thing we know about multiplay modes so far is that co-operative campaign play is in – then we can expect something very special to come out of Vancouver, hopefully by this time next year. ☺

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# Sins of a Solar Empire

**David Hollingworth** revels in galactic domination with a sleeper hit from Ironclad Games.

We're coming to this game a little late, to be perfectly honest. In our defence, the local distribution set-up for the title is... dodgy at best; this meant our usual game getting tactic of calling up a distributor and simply asking for the game was made of pure fail. In the end, we \*gasp\* actually purchased this game online so we could have a proper look at it. Let us just say up front that if you're a fan of the venerable 4x genre (explore, expand, exploit and exterminate), then *Sins of a Solar Empire* is absolutely worth buying.

As strategy games go, *Sins*' setup is classic stuff - three races, of the Basically Human, Not Quite Human, and Utterly Alien flavours are on offer. They've got fancy names and sketchy histories, of course, but the meat of each race is familiar to any strategy fan. This could easily be a sticking point, but in going with such well-recognised archetypes *Sins* lets players get straight into the important stuff - blowing things up.

It may be a 4x game, but the x in exterminate really should be an X. The military aspect of *Sins* is the game's major focus, and nearly every aspect of planetary, technological and societal gameplay eventually feeds into being able to build more and better ships than your AI or live opponents. Is this a bad thing? Well, if you're a cheese-eating surrender-monkey who likes diplomatic solutions and elegant trade arrangements it might be, but for the rest of us red-blooded strategy gamers it's just fine.

The other big difference between *Sins* and most other 4x titles is that *Sins* is an RTS game, not turn-based. Again, this could have been a disaster, but the average game develops so gracefully that you very rarely feel all that rushed or overwhelmed with data, upgrade completion notices or reports that your First Fleet is getting reamed by pirates.

At the start of each scenario you have one planet and a small shipyard under your control. You'll have some starting resources, but you'll need to look to secure more. Credits (what every sci-fi fan knows money will one day be called) comes from taxing your growing populations and trade; Metal comes from metal-bearing asteroids, and Crystal comes from crystal-bearing asteroids. Pretty much every planetary system and colony has one of each, so you plop a mine on them and watch the resources tumble in. Further constructions can boost output, too, so as your military needs expand (and boy, will they!) you'll always need to be keeping an eye on raw materials.

From the get go, military focus aside, it's pretty much up to you how you play and ultimately win each game, and at least in the single player

- which we've played more of - no one strategy seems to dominate the other. You can rush scout ships and colony vessels around the solar system to find the unsettled worlds first, and hope you don't run into anything with guns, or you can wait for a more leisurely build up. Militarily, there are three scales of ship - frigates, cruisers and capital ships - each with their own sub-classes, so fleet composition is similarly open-ended as well. Your capital vessels, which dwarf the other ship types into near insignificance, even level up as their vast crews gain experience. Not only does general performance improve, but you can also





purchase new abilities to further compliment your play-style.

What really impressed us about the game's combat mechanisms is the fact that vessels can be maneuvered within each planetary gravity well; it's not just a matter of sending a fleet of ships into a fight and seeing who wins. It's no *Homeworld*, not by a long shot, but with the larger strategic picture the game presents you can employ some very interesting tactics. There are set routes between worlds, and transit times vary; this means you can send a scout into a system to feel out its strength, carefully withdraw (and you'll get a constant record of how old the data is), send in one fleet as bait, and then another via a different route to enter the system unopposed. It takes timing, but it's the kind of thing military sci-fi authors love to write about, and seems to us to be the closest thing to an 'accurate' presentation of space warfare. Ships even maneuver along elliptic courses, too, meaning that once you catch a fleet out of position it does take them some time to redeploy.

All of these different game components are

also very cleverly presented in *Sins*' UI. In nearly every case, there are at least two or three ways of selecting your ships or planets, and you can view nearly your entire empire at a glance thanks to the Empire Management window. This is a collapsible file-like structure that lists each planet, its installations, and the ships currently in orbit, and lets you manage them no matter what you're actually focused on. Taking heavy losses in a nearby system, but can't leave the fight? It's an easy job to start replacements cycling out of your factories, and not much more work to have them coming along to the hotspot in question.

Finally, it's presented in a wonderfully attractive package, from the bright, old-school menus of the set up screens to the inky blackness of the space you're fighting over. Like *Supreme Commander*, you can zoom out from a single frigate venting atmosphere as it's being strafed by bombers all the way to looking down on entire star systems.

If there's any criticisms to be made of *Sins*, it's that it lacks an overall story-based campaign, and that, like many games of this genre, the end game tends to drag out once you reach a certain tipping



point of success. The games are long, too, but thankfully addictive enough that you'll happily either lose sleep or simply save-game and come back to it once work/study/foreplay is out of the way.

It's a temptation to call *Sins of a Solar Empire* a revolutionary game, but there's not that much in it that's not been done before in some fashion. What *Sins* possibly is, however, is the ultimate evolutionary step of the 4x genre. It is a supremely polished and addictive strategy game; I've said enough. There are worlds to conquer. ☺



VERDICT
Smooth blend of RTS and 4x gameplay; excellent tactical play
Long games; too military for some; no campaign
<b>9.0</b> OUT OF 10



# Imperium Romanum

**Rome wasn't built in a day. But, David Hollingworth discovers, some elements of this game may have been.**

Imperium Romanum is the sequel to the moderately well-received *Glory of the Roman Empire*, and as such it promises more and better stuff than its predecessor. However, again, like its predecessor, it doesn't quite deliver on all the hype.

It does do a number of things quite well, though. *Imperium Romanum's* city building is elegant, with all the usual nested necessities in place – you must mine X, before you can build Y, and then, finally, when the stars are right, you can construct Z. While you're going about all this building and resource rap... I mean, management, you've also got to look to your citizens' happiness. If some resources run low, essential shops shut, and people get angry. Angry people either turn to crime, or may even get into the firebug line of work.

As we said, it's all pretty basic stuff for anyone who's familiar with any city-building title, from *SimCity* through to the similarly Roman-themed *Caesar* series. But where *IR* excels is just how well it all slots together. An excellent radial build interface opens up pretty much your entire construction inventory with a single click – choose the building you want and you can then use the scroll wheel to swivel it in place before finally settling on the perfect spot. It also leaves that building type selected, so that if, for instance, you need to build a whole mess of citizen-housing, you can do so in an almost painterly manner.

It all looks good, too, with wonderful distance blur, trees waving (and growing) in the wind, running water, flying birds and everything else you'd expect from a modern, 3D city sim. It

also must be pointed out that working out the dependencies of certain buildings and resources can be... esoteric at times, and finding those resources can be even harder. A bit more support in this area would not go astray.

Where the game really falls down is in two areas – ongoing gameplay and combat. So, you know, it's not as if it's anything important...

There are three modes of gameplay to get your managing and simulating teeth into. There's scenario mode, which presents you with all kinds of challenges building and managing all kinds of cities all over the Roman Empire. There's the Rome mode, which essentially gives you an unfinished Rome, with your challenge to build as many monuments and important structures (the Colosseum, shrines and so on) while managing the great city itself. And, finally, there's the Timeline mode, which lets you manage Rome at key points throughout its long history; this mode offers a branching storyline, which is sadly as close as you'll get to a 'grand historical campaign'.

The modes on offer are certainly good, and the Timeline mode is downright educational (as are many aspects of the game, in fact – it's a history nerd's wet nubian dream in game form). But we can't help but feel that the selection lacks compared to other strategy/building titles.

Combat, though... well, it's an afterthought, to be honest, which given Rome's bloody history, and how war shaped it as much as philosophical or political action, is a damned shame. It's also galling given that, once you've built your mines, got your shops producing, your farms farming,

and your barracks, well, barracking, the stuff you can do with your troops is limited at best.

Combat also falls down graphically, which only makes it seem like even more of a tacked on element. Your basic infantry don't even bother to carry weapons or shields until they are engaged in combat; it doesn't effect the game, but given how iconic a Roman column is, marching with its shields and pilums, it's a serious letdown. Similarly, when you order your units to attack an enemy settlement, they simply wander aimlessly around the buildings while random fires start and buildings collapse. Warfare's obviously only one single element of the game, and only one out of many, but it's still an immersion-breaker.

Don't get us wrong, there's a lot to like about this game, especially for unrepentant city-building fans, but the flaws do hold back a lot of game's potential.

 PC

Developer Haemimont Games  
Publisher Kalypso Media  
Website [www.imperium-game.com](http://www.imperium-game.com)

## VERDICT

Great graphics; in depth city building; streamlined interface

Lacks depth in campaign play; poor combat.



**6.5**  
OUT OF 10



# Lost: Via Domus

**David Hollingworth isn't much of a fan of Lost, but he does like a good game. Does *Via Domus* deliver?**

**T**here are going to be two ways people approach *Lost: Via Domus*. They are going to be absolute fans of the show, the kind that have made the Lost thread on our forums one of the biggest ongoing discussions. For them, this is just one part of the greater puzzle that is Lost, and they'll snap it up as a matter of course.

The other approach to the game is one of curiosity. You might have seen a few episodes, but have fallen behind, and now feel daunted by the sheer level of myth and canon the show has generated. Perhaps a game is a good way to catch up, and if you're an adventure game fan, it can't be that bad, right?

Well, we're not sure that either party would be especially pleased with the treatment the franchise receives at the hands of *Via Domus*.

The game casts you as a previously unknown survivor of Flight 815, Elliott Maslow. He's a photographer with a nasty case of amnesia, two ham-fisted plot points that pretty much shape the game's entire story. The game covers the first 70 days – so, the first two seasons, roughly – of the show's own convoluted storyline, while also heavily featuring, in true Lost style, many flashbacks that slowly reveal Maslow's own background and inevitably dark secrets.

It's actually the flashbacks that feature arguably the game's best gameplay element. Maslow, being a photographer, tends to think in photographic

terms, and as he walks through each flashback, he must search for the correct angle and shot to replicate the photo that triggered the flashback in the first place in order to unlock a cutscene. It's very reminiscent of similar photography-based gameplay elements in titles like *Project Zero*, and it also locks in nicely with the style of storytelling employed by the show itself.

However, outside of happy-snapping your way back to total recall, there's not a lot to recommend as you blunder about the mysterious island. There's a lot of get this, deliver that style gameplay, a whole mess of *BioShock*-style electrical puzzles, as well as running around avoiding the smoke monster; and of course the inevitable conversations with established characters to make you feel a part of the action.

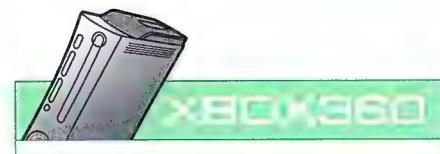
This is where both types of player are going to end up disappointed. Ultimately, the game is badly made fan-service. For one thing, it was plotted out by the show's Executive Producers. The story does a good job of placing Maslow in the context of the show in a sensible and believable way, but it's also remarkably linear, with practically zero replay potential.

Players looking for a good adventure game will be equally let down. The electrical puzzles are more of a frustration than a challenge, aiming for a level of realistic presentation that can only be appreciated by, well, electricians, and trading and interactions with the other survivors quickly reaches the point where you have the entire island's torch market cornered, at which time you can ignore everyone else.

Finally, and perhaps most unforgivingly, the game is short. And we mean play-it-in-an-afternoon-and-never-touch-your-copy again short. There's nothing wrong with short games per se – look at excellent titles like both Max Paynes – but you expect some trade off. When you pay over

\$100 for a five hour or so experience, you want that experience to rock your world, not simply make you look at the screen in consternation, realising that you've just spent a quarter of the week's rent on a shiny new beer coaster.

It does look good, though, and some characters are even voiced by the actors who play them on the show. But it's just not quite enough to make *Lost: Via Domus* (and it should really be *Via Domus*, which means The Way Home) a viable fan experience, while the tired puzzles and run-around gameplay will leave everyone else cold. 



**Developer** Ubisoft Montreal  
**Publisher** Ubisoft  
**Website** <http://lostgame.com>

## VERDICT

**Good graphics; some actual actors; written by the Lost crew.**



**Troubled gameplay; short; written by the Lost crew.**



**5.0 OUT OF 10**





# Pirates of the Burning Sea

Insert nautical jargon here. Insert **David Hollingworth** (and a pirate impersonation) here.

Modern game reviewing has many challenges that old-timey game reviewers never had to face. Chief of these (apart from our biggest whinge – you bloody gamers keep getting younger and younger! (Also, get off my lawn –ed)), would have to be the not so humble MMO. They're by no means a new phenomenon, but the vastness of the modern MMO makes a quick review a gamble, while an in depth review can take more Atomic-hours than the laws of physics allows (while still allowing us to play sweet, sweet *Lord of the Rings Online*, at least).

It's even worse when a game like *Pirates of the Burning Sea* comes along. On the one hand, there's great ship combat and oodles of flavour, while on the other hand, a lot of the content seems either hidden or hard to find. Oh, and on the other other hand, can we just say 'pirates'?

We've been playing off and on for about a month, and what we've discovered is a truly unique and adventurous MMO that is nonetheless hamstrung by its own efforts to fit in with the rest of the MMO pedigree.

The set up of the game is historical, which is a wonderful change from sci-fi and fantasy settings. You play as either a French, Spanish or English national – unless you choose to be a Pirate, in which case the whole world is your oyster, so to speak. If you choose to be a national, you can then pick between three classes – Naval Officer, Privateer, or Freetrader. Pirates get to be, well, pirates.

The aim of the game is essentially to dominate the Caribbean through both force of arms and economic might. Naval Officers are your brave front line types, skilled at combat with ships of the line, while Privateers are best with small ships and boarding actions. Freetraders are no less important, however, as without goods to flood

enemy ports, your nation can never hope to control the game. Pirates? They're pirates. Stop asking.

With each class working together, a faction can effectively control the entire map, or at least the majority of it, at which point the game is effectively 'won' and the server resets to be fought over again. It's this unique ability to not only affect the world, but actually win in an MMO, that sets *Pirates* aside from the pack.

It might seem like a sparse backbone for an MMO, but when you add the fact that each player is the Captain of their own (albeit small, at least to start with) ship from the get-go you can begin to see the possibilities. Let's just say that if your first foray into the open ocean, packed with ships of all nationalities trading, fighting and raiding doesn't leave you gob-smacked, you're made of sterner stuff than us.

So, essentially, the game gives you two avatars – your ship and your Captain. Your Captain you can personalise from the outset, with a refreshingly dizzying array of artistic options. Frock coat or tattered vest? Puffy shirt or leather harness? Barefoot or thigh-high shiny leather boots? Foot fetishism aside, while it's not as in-depth as avatar creation in *City of Heroes/Villains*, it's still a lot of fun.

Your ship, however, starts off pretty tiny, and you'll need to make or find upgrades before you can start altering your pride and joy to match your own preferred method of high seas action.

Your two in-game representations come with different combat options too – the rather under-developed swashbuckling which represents boarding actions and similar, over the shoulder guff, and sea combat, which, frankly, could be a game in and of itself. We've played dedicated age of sail strategy titles that aren't as fun,

gripping and detailed as *Pirate's* floating charnel house.

It all works together very well, and there are entire treatises being written and re-written online regarding the economic model of this digital Caribbean. But what lets the game down is that it lacks flow – new players often find it hard, and we had this same problem, to find the best content, and we're sure it actually puts a lot of players off. Imagine if, in *WoW*, your first missions outside of your starting area were to cross the world for no apparent reason, skipping all kinds of cool stuff along the way. Sure, any age of sail game should feature some exploration, but *Pirates* takes it a touch too far.



Developer Flying Lab Software  
Publisher Sony Online Entertainment  
Website [www.burningsea.com](http://www.burningsea.com)

## VERDICT

Great naval combat; lots of flavour; pretty, almost cartoony graphics

Hard to find content; inadequate individual combat; no ninjas

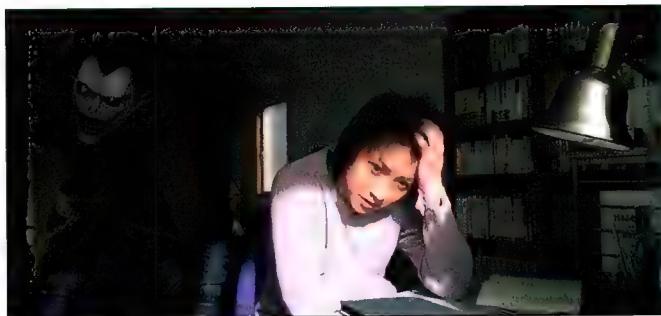


**7.5**  
OUT OF 10

atomic

# CULTURESHOCK

Everything you need to know about geek film, music and literature.



## Deathnote Movie Collection

### MOVIE

Directed by Shusuke Kaneko  
Starring Tatsuya Fujiwara, Kenichi Matsuyama, Takeshi Kaga  
Distributed by Madman Entertainment

The two movies in this collection are based upon the 13-volume manga of the same name, which has also produced an Anime spin off (also distributed by Madman as of February), a couple of light novels and some computer games. Never let it be said that the Japanese don't know when they're on to a good thing. If you're not at all familiar with any of the incarnations... well, we'll try to be brief.

A Deathnote is a book belonging to a god of death (there's more than one); write a name in it and that person is toast. As the story opens, one of these has just fallen to earth, where it is picked up by Light Yagami, a law student with a serious God complex and some simple ideas on crime prevention. From there... well, let's just say that these two movies have one helluva bodycount.

The movies wisely only decide to cover the first 25 'episodes' of the story, and they do so very economically. Sure, character progression is a little stilted, but that's not really the point of the movies; they're an essay on the nature of fandom and obsession, of justice and retribution. There are echoes of the War on Terror, questions of media manipulation and they even have Chairman Kaga from *Iron Chef*. The acting is a little spotty, but for the most part everyone believes in their parts and what they're saying, while the cinematography is at times quite striking. The opening shots of the first film, of Tokyo's night-time skyline, made us hunger for a live-action *Ghost in the Shell* film, they were so moody.

The two movies make for dark viewing, but they're a very intelligent take on a very complex manga, and are very easy to recommend.

Score **8.0** OUT OF 10

## Ghost in the Shell: Stand Alone Complex: The Laughing Man

### MOVIE

Directed by Various  
Starring Atsuko Tanaka, Akio Osoke, O사무 Saka  
Distributed by Madman Entertainment

Here's a film that isn't so much inspired by manga or anime series, but rather a two hour movie that compresses an entire season of anime into one film. Oh, and of course that anime is inspired by the movie, that was inspired by the manga. For some reason Japanese media seems to be able to get away with stuff that Hollywood would either cock up outright or get accused of cashing in on. Whatever the case, it usually ends up producing good material no matter what the format.

We're not sure about *The Laughing Man*, though. As great as the first series of *GiTS* is, the fact there are different animators over the course of its 26 episodes makes for a very spotty appearance for this film. What's more, even though *The Laughing Man* only focuses on a plot thread that ran through about ten of the episodes, it's still a drastically cut-down version of the story. Given the complexity of that arc – without even going into too much depth (we seriously do not have the room) it involves master hackers, corporate cover-ups, political intrigue, literary allusions, and inter-service rivalry to name just the major points – it may well be nigh-impenetrable to anyone who has not watched the series, or at least a part of it. Even if you're intimately familiar with the series and all its twists and turns, it's hard not to keep a running commentary of what scenes are being missed out on.

Score **7.0** OUT OF 10

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# The white-bread music option

It's happy fun music time, with Zara Baxter! Applause!

**A**re you a white bread eater, or do you prefer wholemeal? Maybe you'd rather have multigrain? The types of bread on our supermarket shelves reflect differing granularity. Granularity is a term describing the size of components that make up a system. So in our bread example above, the size of the wheat/grain particles in the flour are representative of the granularity. High granularity means tiny particles – white bread – while low granularity means large particles – wholemeal – and you can also mix high and low granularity subcomponents into a single end-product – the multi-grain solution.

In general, geeks are high-granularity seekers. You can tell that just from looking at Linux. If there's a feature that's tweakable, then Linux lets you tweak it.

Not surprisingly, Atomic readers are also fond of high granularity. Just read one of Josh's columns about latency, CAS timings and voltage and you're in a high granularity zone. Most people are low granularity when it comes to RAM and consider only lots vs not enough, or at an even lower granularity, they only consider whether they're using Mac and PC and don't think about the RAM at all.

Which leads me to iTunes.

iTunes is a medium-granularity application. You can sort any track according to 37 different types of information (the column headers in your iTunes interface), and additionally group tracks into playlists that reflect additional types of information. Some of those playlists are pregenerated, such as most recently played, most highly rated, purchased music, and are sufficiently global across iTunes installations that we can call them additional labels, even if they are impermanent labels. Finally, there is the information contained within the Get Info, which you cannot sort on, such as Channels.

The playlists add additional granularity, but it's a lot of work to create enough playlists to usefully exploit it.

And for many geeks it's not nearly enough. Take me, for example. I'm a writer, and I use music as part of my writing tools. It helps me to acquire and sustain a mood necessary to complete certain kinds of tasks: I use *The Lord of the Rings* soundtracks, when I'm close to deadline, to put me in a suitably heroic mood. It also helps me get inside the head of a character when I'm writing fiction: Ashes to Ashes, from the *BlackHawk Down* soundtrack, helps me remember what a particular protagonist thinks, feels and experiences. I want to tag that track with the character name as well as other characteristics.

But in iTunes, it's hard to label something as "a track with no vocals" and also "sad track" unless you cannibalise the usefulness of Genre, Composer or one of the other main fields. You can put it into comments, but that's time-consuming. And not entirely useful if you want to play songs from dark to light mood, as you have to create a playlist or set your criteria in the right order for sorting; nonvocal, modern, sad vs nonvocal, modern, upbeat. I don't know about you, but I want to label a track's mood (often on several axes) whether its vocal/nonvocal, and what the chief instrument used is – so when I'm writing I can pick a guitar-heavy, nonvocal, intense and haunting, sad song or a Hammond organ-heavy, nonvocal, light and breezy, sad song.

Fortunately, a few clever folks have developed add-ons that almost do what I want. *Moody* tags your songs by mood on two axes, from light to intense and from sad to happy. Then, in the comment of composer field, they use a single word identifier of the type of track – MoodyA4 is an intense happy track, Moody B1 is a light sad track. This lets you sort by mood, which is pretty useful. But it's still not terribly high granularity – just 16 additional labels.

The problem with granularity on a very high scale, for something like iTunes, is that it's time-consuming unless it can be automated, and subjective ratings such as 'mood' and 'intensity' can be quite idiosyncratic.

So, to take it a step further, you could use *Quick Tag* (Mac) or *Qloud* (Windows), and unfortunately requires joining a tagging community, though that helps with providing suggested tags, which allow multiple tags per song and sorting for those tags for better granularity solutions. Essentially, they provide automated and easily sortable comments. So you could use them to rate your tracks from 1-20 instead of 1-5 and to rate for mood, live vs studio, party music vs writing music, and so forth.

I think that gets iTunes from multigrain to whitebread, but it'd be nice to have supersoft wonderbread available. And apart from having 100 columns in my iTunes interface, I can't think of a better way. Although I might agitate for inbuilt tagging.

Zara Baxter is still compulsively labelling her iTunes library. If she's not back in a month, send intense, live, happy, vocal, 5-star rated punks to find her.  
[zbaxter@haymarketmedia.com.au](mailto:zbaxter@haymarketmedia.com.au)

“The problem with granularity on a very high scale, for something like iTunes, is it's time consuming...



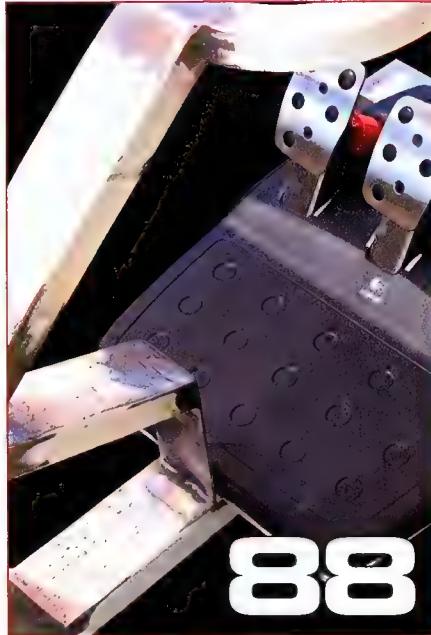
# TECHNIQUE

HANDS-ON TUTORIALS FOR THE TECHNICALLY INCLINED

Ron Prouse is back, and this time with possibly his coolest build ever. He likes cars, you see, and he really likes racing car games. As you may have guessed from previous issues, he also really, *really* likes building stuff, and this month he combines his three loves and starts a mighty build project – a DIY racing car cockpit, built from, of all things... well, you'll see soon enough, and we're sure you'll be impressed.

If welding and sanding aren't your thing, though, we've got an excellent look at Windows Home Server, a ground up walk through of what it can do for you and your home network, especially if you're hoarding lots of large media files.

Both articles this month are the first in ongoing series, so get set for some in depth computing and hardware shenanigans.



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Stephen Reeves takes us on a walk-through of this new – and actually very good – server OS from Microsoft. Bet you never thought you'd hear that in Atomic!

**DIY Racing Simulator Pt01** 88

Ron Prouse fires up his welding and grinding tools and does unspeakable things to metal in an effort to build his very own race car cockpit.

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Chris Taylor looks at some of the more esoteric courses you might want to get into at uni, and where they might take you in your professional career.

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Your questions. Dan Rutter's answers. Need we say more?



## Win these great speakers!

This month we've got FIVE Edifier S330 Powered Audio Speakers to give away to lucky readers. Each set of speakers is worth \$199, and there's only way you can win them!

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DIFFICULTY **BEGINNER**

# Introduction to Windows Home Server

Stephen Reeves shares his love for and insights on this latest Windows...

Where are your files? Are they littered over several hard drives, or even several computers? What about your really important files, or your media files? Wouldn't it be great if you could store them all in one place and still have access to them from anywhere on your network, or anywhere in the world via the internet?

Do you back up your PCs on a regular basis? If not, why not? Well, for one, backups can be a pain to set up and manage at the best of times, so much so that many people just don't bother.

So, what sort of program or system can hold all your important files, and back up your networked PCs?

Let's have a closer look at the features and components of Microsoft's latest operating system, Windows Home Server, which might just be the solution you're looking for.

## Honey, I'm home!

Windows Home Server is a product that has been designed by Microsoft to fill a void in the home market, aimed at households with three or more networked PCs and a broadband internet connection. It's set to fill a few roles; client backup and restore, remote access, media storage and file storage. In addition, it has the ability to serve media files to media extender devices such as the Xbox 360.

## Windows Home Server Toolkit

The Windows Home Server Toolkit comes with a bunch of handy tools, including a Connector Troubleshooter to diagnose connection issues. It also comes with an add-in for your server that adds a lot of new features, including access to the command prompt in the Console, the ability to change backup warning periods and a bunch of diagnostic tools for server storage and remote access.

## Mommy, Why is There a Server in the House?

Helping Your Child Understand the Stay-At-Home Server



▲ Microsoft's Stay At Home Server; even servers like to spend time at home wearing their pajamas.

Windows Home Server was originally conceived as a headless appliance; simply plug it into a power point and your internet router, install the Connector software on the first computer and finish the setup through the Console. No keyboard, mouse or monitor required. Gigabit networking is recommended, however most internet routers don't provide gigabit ethernet ports.

As a consumer device, quite a number of manufacturers have expressed interest in making and selling Windows Home Server units, and some are already on the market, but unfortunately, none are yet available in Australia. Several local white-box manufacturers are selling Windows Home Servers based on standard desktop components, however.

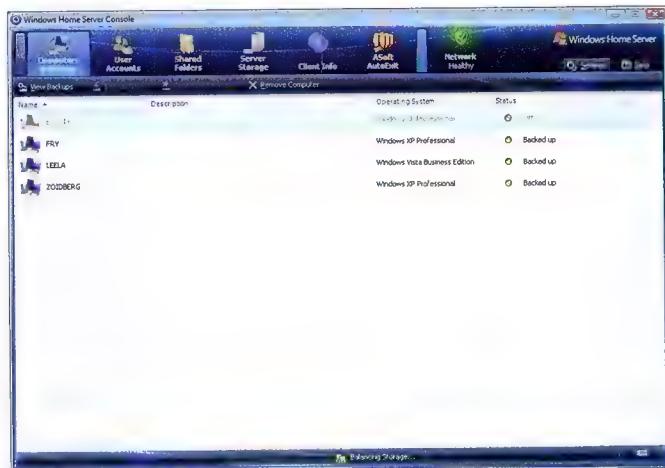


▲ HP's MediaSmart Server, the embodiment of the Windows Home Server concept.

## Add-ins

Microsoft has appealed to the enthusiast crowd, as well as the average family, by promoting the use of Add-ins that add extra functionality to the basic Windows Home Server, such as the ability to synchronise your Photos folder with your Flickr account, or the ability to wake up and shut down network computers or even to delve into the world of Home Automation through the use of X10 controllers. It is based on Windows Server 2003 SP2, which is important when selecting compatible hardware. OEMs, such as Hewlett Packard, have even made custom Add-ins to suit their particular hardware.

There are already a number of commercial add-ins available, including, Avast! Anti-Virus WHS Edition, which includes an anti-virus engine for the server and ten client licenses, and Diskeeper 2008 HomeServer, which is a hard drive defragmentation utility designed especially for Windows Home Server. The usual defragmentation utility supplied with Windows Home Server is not capable of defragmenting the Storage Pool.



▲ Server management is easy through the Windows Home Server Console.

## Windows Home Server Console

The main way to interact with your server is with the Windows Home Server Console, a remote desktop application run directly on your Windows Home Server. You can access it by double clicking on the Connector tray icon or right-clicking the Connector tray icon and selecting it from the pop-up menu. You will then be prompted for your Windows Home Server Password.

The default tabs are Computers & Backup, User Accounts, Shared Folders and Server Storage. You also have buttons for Network Health, Settings and Help. Add-ins will also sometimes give you extra tabs to interact with them.

### Computers & Backup Tab

The Computers & Backup tab lists all the computers currently connected to your Windows Home Server; computers are connected to Windows Home Server when you install the Connector software on them. From this screen you can View Backups, Backup Now (a manual backup), Configure Backup and Remove Computer. Viewing the backups opens a dialog box showing every backup currently held for the selected computer and the ability to Manage them, and be able to View or Restore files from any backup listed.

You have an option to turn backups off for selected computers; useful if a computer is no longer active on your network. Turning off backups only stops backups from running on that computer, while any existing backups are still held. It will also prevent annoying notifications that the computer hasn't been backed up recently.

Removing an entire computer removes that computer from the Console and deletes all its backups, which is kind of handy if the computer is never going to be connected to your network again.

“ The first back up can often be the largest, as it will copy every cluster on the system... ”

Backups are one of the most important things you can do to secure your data, but they rarely ever happen because it can seem rather too hard to organise. In the past you would have had to organise a backup utility on every PC and point it at some storage, either locally attached or attached to the network. Microsoft has recognised this and built an easy to use backup facility into Windows Home Server.

You can install the Connector software on up to ten client computers, which then configures them for nightly backups. The backup system uses Single-Instance Storage, which will only store a single instance of any cluster, no matter which computer it was originally backed up from. What this means is that only new or changed clusters will be backed up. And if the same cluster is on another computer, it will not store another copy of it.

The first backup will often be the largest, as it will copy every cluster on the system, but the next computer may have a lot of files the same, such as Windows, Office and applications, so only unique clusters will be copied to the server.

You can configure the backup for each computer, excluding directories or volumes as needed (eg. P2P folders and video editing data). If you've installed Microsoft's Windows Home Server Toolkit Add-in, you can set the warning level for each computer (for instance, if a machine hasn't been backed up for a certain number of days, give a yellow or red alert).

To stop the backups from clogging up the server, you can set the backup aging rules; cleverly, Windows Home Server will only keep certain backups depending on how old they are. The aging rules define how many daily, weekly and monthly backups are kept. If you only keep the past three of each, you will have the last three daily backups (the first backup of the day), the last three weekly backups (first backup of the week) and the last three monthly

backups (the first backup of the month).

You can initiate a manual backup of any client at any time, and select whether to keep it indefinitely, let Windows Home Server manage it according to the aging rules or flag it for deletion. Backup deletion (cleanup) occurs every Sunday morning during the backup period, or can be run manually as required.

**Windows Home Server comes with a set of standard folders, but you can add more.**

## Client Restore

Because of the cluster-based backup scheme, restoring is a simple process, from single files through a virtual drive in Explorer, or even restoring a whole backup after a disaster.

Simply pop the Client Restore CD in the drive, and boot from it. If the Restore Wizard cannot find your network or storage controller drivers, you can copy these to a USB flash drive from an existing backup.

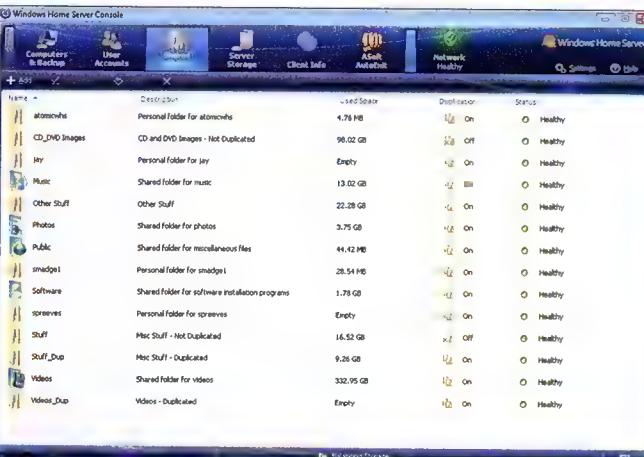
You then pick the computer and backup you wish to restore from the lists, select the partitions to restore to and it will download it to the computer and away you go.

It can be a great tool for upgrading your hard drive, as you can restore your backup to a newly installed larger drive. If you have installed a new drive, you have the option to partition and format it using the Disk Management tool.

## User Accounts Tab

Windows Home Server can have ten users added, plus the usual guest account. Users can be added using the Windows Home Server Console; you can set folder permissions and whether they can access the system remotely through the Remote Access Web Site. Remote Access does, however, require you to set a strong password. For best results, you should ensure that the usernames on the Windows Home Server match the usernames your users have on their PC – remember: they're just users after all! The users will then have the opportunity to synchronise their password with the server.

The Guest account can have a password, but cannot be used to remotely access your server through the remote access web site. It's also disabled by default. You can use Windows Home Server with only the Guest account if you choose; simply activate it and give it full access to all the shared folders.



**Your files are kept in easy to manage shared folders.**

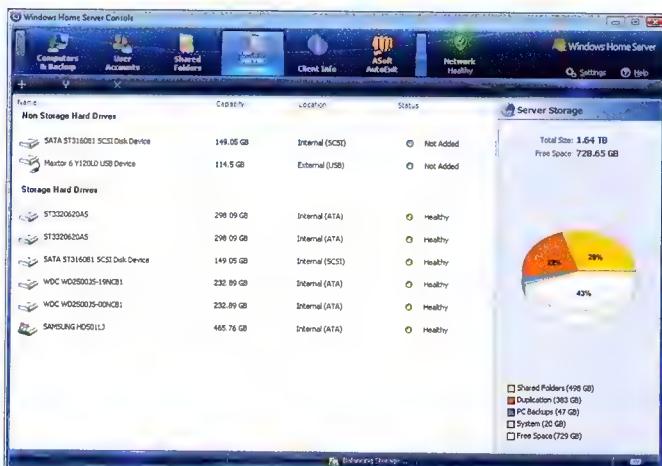
## Shared Folders Tab

The Shared Folders tab shows information about the shared folder on your server. Each shared folder has a name and a description, and special folders have their own icons. This view shows how much data is in each folder, though it doesn't take into account folder duplication, which doubles the amount of space it uses. Here you can also see if folder duplication is turned on and the health of the folder; a folder is unhealthy if it's set for duplication and duplication has failed, or if files in that folder are on a failed or missing drive.

From the Shared Folders tab, you can Add or Remove additional shared folders. The default shared folders cannot be removed or renamed, however.

Right-clicking on a shared folder gives you an option to View History, which will open a window that shows you a graph of disk space used over time. The time period is adjustable between one week, one month, one year or the entire history of the folder.

Windows Home Server comes with a set of standard shared folders, as we've said, but you can add more as required. As long as you have two or more hard drives installed, Shared Folder duplication can be enabled, where the contents are stored on two hard drives. Shared Folders can also have permissions based on who can have access to them (No Access, Read Only and Full Access).



**View and manage the disks in your Storage Pool.**

The five special folders are Software, Public, Photos, Music and Videos.

Photos, Music and Videos are designed to hold media files and can be set up for streaming to Media Extender Devices.

Software contains the latest Windows Home Server connector software, and an ISO file for the Recovery CD, along with the Windows Home Server Add-ins.

Public is accessible to everyone by default.

The User folders, on the other hand, are only accessible to their owner. User folders are created automatically when users are added.

## Shared Folder Properties

The Properties for each shared folder can be accessed by clicking on the shared folder and then clicking the Properties button, like any normal Windows set up. The names of the five special folders and the user folders cannot be changed, as we've said, but the descriptions can. The General tab shows how much space the folder is using and offers a tick box to turn Folder Duplication on or off. You can then set user permissions on the User Access tab.

## Server Storage Tab

The Server Storage tab lists all your hard drives, their total capacity and their health status. It shows a graph of the Storage Pool, how much space is taken up by the System, the Backups, the Shared Folders and Duplication as well as the total Free Space.

On the Server Storage tab, you can Add Drives, Remove Drives and Repair Drives.

The Add Drive option starts the Add Drive Wizard and prepares the drive to be added to the storage pool; this involves formatting the drive, so you should make sure you have no important data on it before adding it to the system.

The Remove Drive option starts the Remove Drive Wizard, which checks to see if it can move all the files and backups (if any) off the drive before you safely remove it. If it thinks your files, backups or duplication is at risk, you have the option to cancel or continue with the remove operation regardless. If you continue with the remove operation, you may lose data – you've been warned!

The Repair Drive option is available when you have an unhealthy drive – it runs CHKDSK on that drive and attempts to fix any errors. It will check that duplication is working correctly as well. It may require a reboot if it needs to check the SYS volume (C:).

## Storage Pool

The Storage Pool is a single virtual volume that contains the shared folders and the backups that are stored on the server. The Drive Extender tool is used by the system to move files to the other disks and make sure that file duplication is working. Adding drives to the storage pool is taken care of by the system; new drives are not assigned drive letters in the conventional sense, but their capacity is simply added to the available space in the storage pool.

You can remove drives from the storage pool through the Windows Home Server Console, and the Drive Extender will move all data off the disk before allowing you to safely remove it. If there is not enough free space remaining in the storage pool, you will be warned that you may lose data, backups or folder duplication.

You can also install hard drives into your system without adding them to the storage pool, and then you can assign them a drive letter. This is useful for installing extra functionality such as Sharepoint, databases, virtual computers and other things that shouldn't be stored or spread across the storage pool.

Windows Home Server can utilise external hard drives as well, such as USB2, Firewire and eSATA drives. Great if you need to add more drives than you can fit in your case

Power Pack 1 introduces a feature that allows you to add a drive as a backup drive, which can store a copy of your backup database and/or selected shares, which is useful in an emergency.

It's a good idea to enable SMART (Self-Monitoring, Analysis, and Reporting Technology) in the BIOS, as Windows Home Server uses SMART information to detect if a drive is failing. You can install third-party Add-ins to monitor your drives as well.

## The nasty, V1 bugs

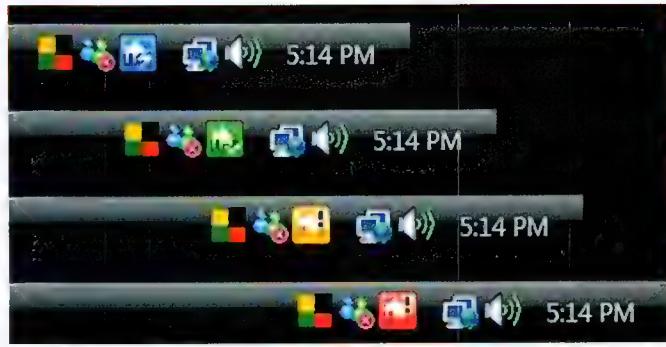
When you use certain programs to edit files on a home computer that uses Windows Home Server, the files may become corrupted when you save them on the home server, according to article KB946676 in Microsoft's Knowledge Base.

What this means is, if you edit certain files using certain programs on your Shared Folders, you run the risk of corrupting those files, and if Folder Duplication is active, the corrupt file will be also be duplicated. The risk of corruption increases when you're transferring large amounts of data to your home server at the same time.

It is suggested that you edit all files on your local computer and copy them up to your shared folders after you've saved them.

This bug does not affect the backups stored on Windows Home Server.

An earlier bug (KB943393) relating to the inability of Windows Home Server to store files with Alternate Data Streams (ADS) has now been patched.



Network Health is communicated through the Connector's Tray Icon.

drive at any time. You don't need special hardware, and your drives need not be the same model or size.

The other benefit is that each drive is still an NTFS formatted volume, so if worse comes to worst and you need to access your data, you can always pull the drive out and connect it to another computer and still have access to all the data stored on it. This is simply not possible with RAID.

Using RAID on Windows Home Server is possible, but not supported, and can make fixing drive issues trickier. That said, RAID 1 may be desirable for the system drive.

If one drive fails, the server will still operate with the other drives, and it keeps track of which files are stored on the failed drive. When the failed drive is replaced and added back into the storage pool, all the duplicated files will be repopulated by the Drive Extender. If there were non-duplicated files on the failed drive, then they will be lost.

## Remote Access

Another interesting addition to Windows Home Server is the Remote Access feature. Through a web interface, you can have access to your shared folders, home computer's remote desktops, and the Windows Home Server Console. Through Windows Live Custom Domains, you have access to a homeserver.com subdomain, through which you can access your own server on the internet. Windows Live Custom Domains will supply your server with a secure SSL certificate issued by GoDaddy.

Windows Home Server uses UPnP to make port forwarding easy on compatible routers; instructions are available for manually forwarding ports on routers that aren't fully compliant with UPnP, or if you don't wish to use UPnP. Windows Home Server communicates your current external IP address with the Windows Live Custom Domains (like DynDNS).

Note that Remote Desktop is only available on Windows XP Professional, Windows Vista Business, Enterprise and Ultimate. The Home versions of XP and Vista do not have the required components to accept remote desktop connections.

What this ability does is give you the ability to create usernames for family and friends to access your Windows Home Server remotely, and you can set Shared Folder permissions based on what you wish them to access (No Access, Read Only or Full Access). You can even define areas where they can download or upload files or photos.

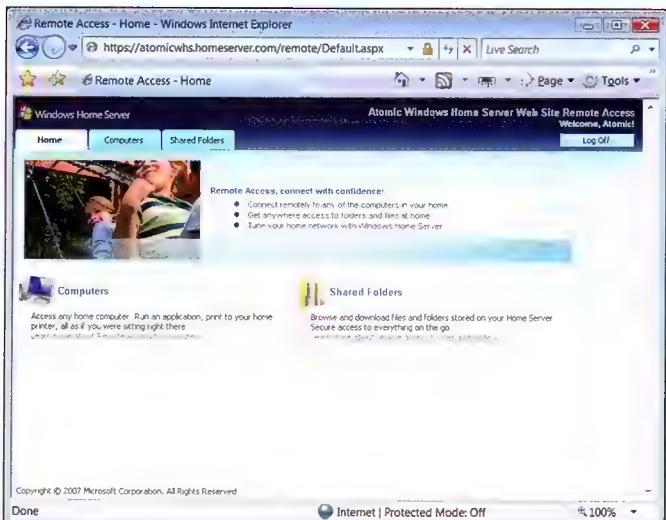
## Network Health

One of the most interesting tools added to Windows Home Server is the Network Health notifications, which are communicated through the Connector Software's system tray icon; it will change colour and pop-up with a description of the problem or status. You can turn this feature off on selected computers, as not all users need to know everything that is going on with WHS.

Network Health has three levels of severity; Green means that your network is healthy, Yellow means that your network is at risk, and Red means you have a critical problem. In other words, red means you should connect to the Windows Home Server Console and click on the Network Health button for more information. The Tray Icon will turn Blue when a backup is occurring.

## What about RAID?

The Storage Pool is similar in respects to a RAID array, but has more benefits. Adding drives to the storage pool is easy; you don't have to rebuild an array just to add a new drive. You can therefore expand your storage or replace a



### ▲ The Remote Access Web Site gives you access to your Windows Home Server.

There are a number of things that will trigger a network health notification, such as clients not being backed up, Vista client security notifications (anti-virus, firewall status, etc and don't we love them so), backup service, server activation status, server drive health and port forwarding problems.

## Customisations'

Being based on Server 2003, you have a bit of flexibility in customising your server. At this point I must stress that you should not try customising a live server with irreplaceable data on it. That only leads to pain and heartache and a mighty gnashing of teeth.

Microsoft has a 120 Day Evaluation version of Windows Home Server, useful for testing your hardware or add-ins. It's available for free, plus postage costs (or you can download it, since if you want such a thing as this you're likely hip to that internet jive).

According to Microsoft, a lot of the technology in Windows Home Server will break if you stray too far from the provided tools, and you don't want that. Any form of disk management outside of the Windows Home Server Console should be off limits, even though there is nothing actually stopping you from breaking the system; i.e., there are no big red pop-ups asking you if you would like to trash your system...

The Windows Home Server cannot participate in an Active Directory domain, either as a workstation, or as a domain controller. If you add domain users as local users on the WHS they can access it, bearing in mind that you're still limited to ten users plus Guest.

## Building It Yourself

Microsoft has made the Windows Home Server operating system available through the System Builder channel, which allows people to purchase the software and build their own server. You usually need to purchase the software with appropriate hardware, but some resellers don't require it.

**Power usage:** An always-on system is great for availability reasons, but say you want to reduce your power consumption. You can build a system using low powered components, and only one or two hard drives, that consumes less electricity than a whole computer. Because the operating system has low processing overheads, you can use slower, cooler CPUs or even investigate fanless systems if low noise is a big priority.

**Maximum Storage:** Some people, especially in large households, will consume several terabytes of hard drive space. Windows Home Server is perfect for storing not only everyone's media files and documents, but will backup everyone's PCs too. You're only limited by how many drives your hardware supports. Systems of 8TB and over can be built easily enough, given a large enough case and appropriate hardware (see issue 85's PC case round up for some great examples). As long as the hardware is supported with Windows Server 2003 drivers, it will be fine for Windows Home Server.

## Power Pack 1

Power Pack 1 is the first major release of new and improved features for Windows Home Server. Added will be a server backup facility and some adjustments to the remote access portal. It is expected to be released early 2008 – hopefully soon, in other words.

**Processing Power:** Windows Home Server itself has low processing overheads, but you can add extra functionality if you have enough processing power at hand. People have been known to run several virtual machines on top of Windows Home Server to provide extra network services, such as email, proxy caching, domain controllers, and so on. If you intend on adding virtual machines to your system, having plenty of processing power and memory is important; any sort of on-the-fly media encoding tends to be processor intensive as well.

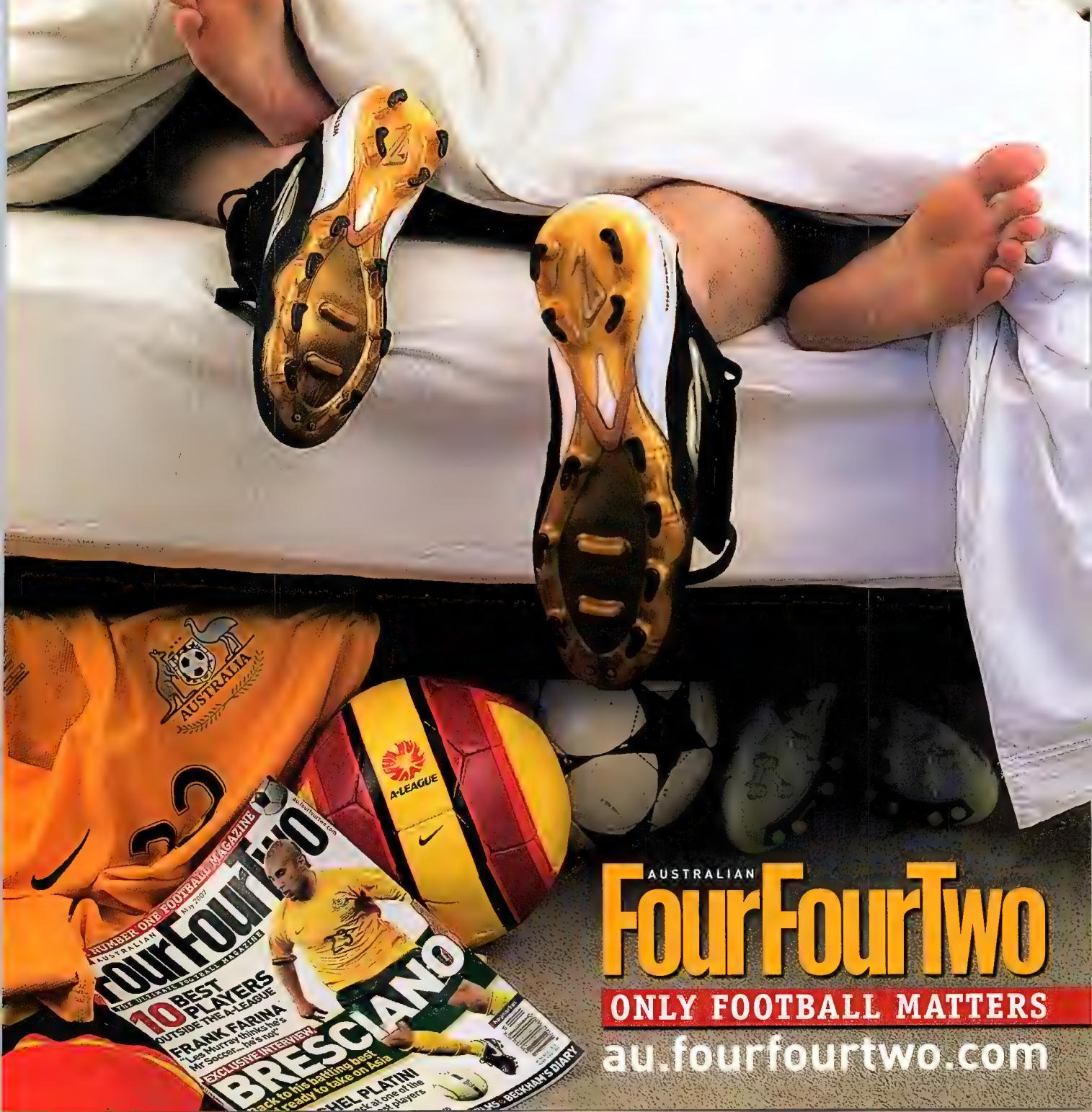
## The Thrilling Conclusion

So, I'm sure you can find a use for a Windows Home Server in your home, or the home of a friend or family member! What a way to give – and receive – peace of mind, by storing digital memories and documents safely.

In future issues, we'll be looking at more features of Windows Home Server, including an in-depth look at its Remote Access abilities, using add-ins and building a Windows Home Server for yourself.



# FOR MEN WHO JUST CAN'T GET ENOUGH...



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DIFFICULTY ADVANCED



# Car Simulator Tutorial Pt 01

Want a fancy racing car cockpit simulator, but don't have the big bucks to buy one? **Ron Prouse** helps you make one yourself!

**S**imulator (noun, pronounced: Simmyoo laytar) a device, instrument, or piece of equipment designed to reproduce the essential features of something, e.g. as an aid to study or training. {Ref:- Encarta Dictionary, English (UK)}

Eons ago, it was common practise for parents to provide children with their very own transport simulator – a wooden, semi-oscillating device better known as a rocking horse. The rocking horse cultivated basic motor-skills and confidence that were essential for when the youngster finally sat on the real version. Very useful at a time when the horse was a conventional form of transport.

Can you sense where this is heading? Jump forward a few centuries and consider your gaming habits... do you like *Gran Turismo*, *Need For Speed*, or even the ancient *Ridge Racer* titles? I hope that you said 'Yes', as you will therefore agree that driving games are not mere folly, they are a sensible



▲ Something you thought you'd never see in Atomic...

## SUPPLIES

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- Logitech® G25 Racing Wheel, \$349.00
- Logitech® G51 Speaker System 5.1 channel sound, \$216.00
- Buttkicker Gamer, \$274.00

We also used a heap of steel stock and sheet in various sizes, and a Repco Ergometer exercise bike!

activity that add critical skills and may even save lives on our roads. True story!

The thing is, gaining useable and transferable skills requires an 'activity accurate' and immersive simulation – as the old cliché states, 'only perfect practise makes perfect', and we have found that it's difficult to drive an average car with a keyboard or gamepad. The answer is to wander out into your workshop, construct the very best simulator that you can, and spend many hours practising. It's called skill enhancement, and no-one will be able to accuse you of wasting precious time while you perform this important ritual.

## TOOLS

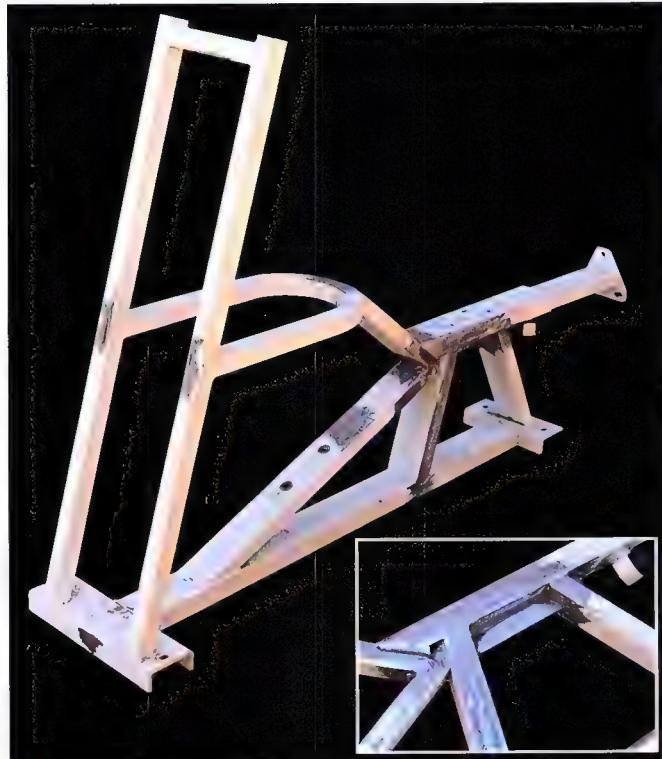
Some of the tools used in this tutorial might not be found in the average workshop, such as the MIG welder, but most of the work is performed with more mundane items such as a 100mm grinder, drill press and drills, finishing machine/disc sander, and 1/2 sheet electric sander. The main requirement is a decent bench or table, providing a solid, flat surface to operate on. Or the floor.

As you read on you will find that this tutorial is more of a work-log than a step-by-step fabrication blueprint, considering that your individual project will be impacted by variations in system hardware, construction materials and even the driver's physical dimensions.

Interestingly, the starting point that we used was already a legitimate simulator, as it was originally designed to re-create a form of medieval torture, called exercise. Why would we use such an inappropriate piece of apparatus? The reasons are two-fold. Firstly, the basic structure will be perfect for our needs, and much of the required cutting and welding has already been done; secondly, the huge number of 1980s-era exercise bikes on rubbish tips all over Australia means that getting one for nothing should be relatively easy. And don't overlook the fact that cutting up gym equipment is a 'nerd-friendly' activity.

After wandering around on the net looking at other people's driving simulators, it became obvious that they mainly fell into two categories; the arcade-style simulator that looks like a small racing car, and the enviro-simulator that reproduces the true ergonomics of a full size cockpit, but looks a bit ungainly. So, in true Atomic style, we decided to go with the latter, for a more realistic experience! The end result will be a behemoth, at about 1.5 metres long by a metre wide, and weighing in at 80kg or more, but it will be the next best thing to actually being there. The high-quality hardware that we chose is also going to make the project realistically tough, so we can turn our friends loose on it without fear of premature breakage.

With our extensive planning out of the way, the first step was to deconstruct the 'core frame', getting rid of the stuff that made our simulator an exercise bike. After removing the bolt-on parts all of the existing brackets and locating lugs were ground off using a 100mm grinder, and the seat post



▲ After some cutting and welding, it still looks like an exercise bike.

## DISCLAIMER

Whenever you pick up power tools, cutting and grinding instruments, or even a can of spray paint, you are putting your general wellbeing at risk from some form of industrial level accident. We take every precaution by wearing appropriate safety equipment, using tools with respect and within their limits, and by not inhaling the contents of glue and paint containers. We suggest that you should follow a similar regime, and seek professional assistance and guidance if you are attempting a task outside of your skill set.

NB. Atomic and staff are not responsible if you hurt yourself

and support beam were cut off at a pre-determined height of 225mm from ground level. To create a solid platform across the centre of the structure, the horizontal wheel-support bracket was cut, bent down and MIG welded back down to the seat bracket. The seat post and rear support beam were then strengthened by using a 25mm wide, 3mm thick 'knife blade' gusset to join and brace them together at the top (see inset). The adjustable seat post was then MIG welded to the chassis along the 17 seams of the centre bracket... yes, it has inherent strength, but this is where all of the stress will be during use, and where most of the weight will be hanging from!



▲ The seat mechanism was a project in itself!

The next step was to fabricate the seat mount, made a little harder because we wanted to retain the 'adjustability' – to accommodate as many users as we could. The original seat post had 12 different settings at 25mm gaps, giving a potential for 275mm of seat adjustment, the issue being that the bracket for the seat was 310mm further back than we wanted. The answer was found in a single word: cantilever; which is to construct something in such a way that it is attached or supported at only one end, a common practise used in modern high-rise buildings. By fabricating a 3mm thick steel plate to be fixed at the rear of the seat post, welding two 30 x 30 x 2.5mm steel bars to the plate and running them forward for the required 310mm, the 'real' 3mm thick seat bracket can then be welded to the bars in the correct position. The seat bracket is therefore hanging in mid-air, supported totally by the rear plate. By 'boxing-in' the rear plate and bars, to give additional strength, the assembly retains maximum stability.

All of the welding was done with a gas-less MIG, which is easy to use but very messy, especially in the hands of a total novice like me. Thankfully, the welds and splatter can easily be dressed-up using an angle grinder with a 40-grit mop wheel, probably the most aggressive abrasive device known to humanity!

The inside of the boxed-in section would be hard to paint effectively once it has been welded together, so it was given a coat of gloss aluminium prior to the cover plate being spot-welded into place, and will be touched up later.

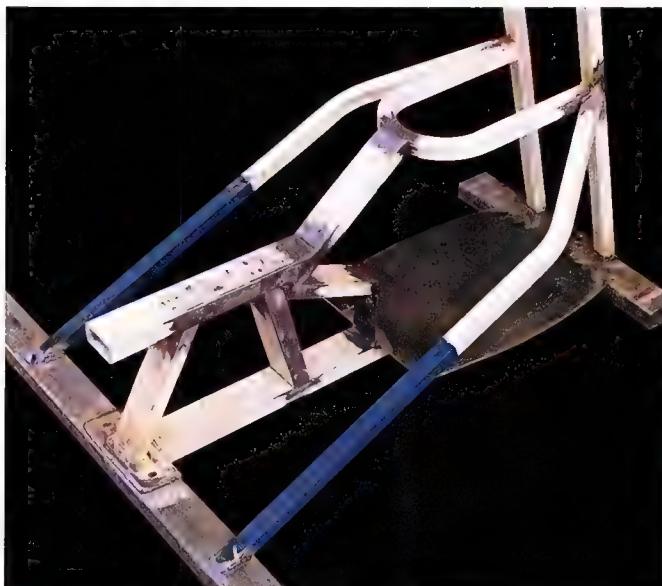


▲ At last, some gaming peripherals.

Once assembled, the outer surfaces were de-burred and rounded over, with all sharp edges removed. The rear view is not pretty, but there's a reason that we used 30 x 30mm stock and left it open... 25 x 25mm stock will slide inside it, and that will be a useful attribute later.

The next step was to set up the mounting plate for the Logitech G25 foot pedals. It is important to get this part right, as all of the ergonomics revolve around the pedals as the main 'fixed point' of the car. Initially we were going to cut up the pedal box so that it would fit into the available area, but once we had appreciated just how well-made the unit was, and the solid construction of the heel-plate, the concept changed. The initial task was to weld in a wider front cross-bracket at the very front of the chassis, fabricated from 460 x 65 x 35mm stock, to give some added stability.

The first change to be made was the support bracket that ran forward from the seat-post. The bracket was cut to length, and then boxed-in with a section of 3mm thick plate. The floor pan was then cut out from a sheet of 2mm thick steel, recessed at the front around the 25 x 25mm uprights. We then cut the sheet to the shape of the pedal box, and seam-welded to the existing structure. This required some filling and bending of the floor pan around the cross-bracket, which was then shaped and smoothed with a 40-



▲ Everything has a use if you think hard enough.

grit mop wheel. The floor pan was spot welded to the lower support, and then all of the outer edges were rounded and chamfered, ready for attaching the pedal box with concealed screws.

At Atomic, we live by the creed, "Never throw anything away!" The two curved white sections that are connected to the blue steel supports are the original exercise bike handlebars! They were 25 x 25mm square stock, and had a perfectly shaped bend for the look that we were trying to achieve. Initially these support beams were for aesthetics only, to give the suggestion of skeletal bodywork, however they will also be used as the mounting point for additional framework that will house the G25 shifter and control buttons. A wider rear cross-bracket was added, fabricated from 760 x 65 x 35mm stock, to give some added stability at the very back of the chassis, and the support beams were used to tie the cross-beam to the front uprights.



▲ Fabricating 90° bends the tedious but accurate way.

The additional framework required a couple of 90° bends, something daunting for those of us with, at best, 'very average' welding ability. A skilled metal worker would laugh, but after a couple of extreme failures we developed a fiddly but effective way of mitring the 25 x 25 x 1.6mm square stock. The length required was marked on what would become the outer edge, and then two 45° lines drawn out on the radial from that point. Using an angle grinder



▲ **Metal sculpture finds a valid use!**

with a 1mm thick cutting blade, the steel was carefully cut away on both sides, and across the centre, making sure not to cut through the outer edge. The illustration should make this a bit clearer, with the triangular section that was cut out shown on the left. The cut edges were then chamfered slightly with a file to give a V-profile when pushed together – this will help to get a good, strong weld. With one side still attached, it is now easy to bend the two inner edges together until the 90° bend is formed. To make sure that the angle is exact, a steel set-square was used on the inner edge, the work-piece clamped down securely, and the steel then MIG welded along the seams. Once the three sides of the joint were welded, the 40-grit mop wheel was again used to remove the excess metal and clean the outside surfaces. The last step was to remove any sharp points and round-over the edges, using an angle grinder with an 80-grit sanding disk. With the chassis on a flat surface,



▲ **We never claimed to be welding experts, but it does hold together.**

a spirit level was used to ascertain the correct angles for the side bars to be attached to the existing side supports, and the steel was then cut to shape and welded into place.

The 100 x 100mm mounting bracket for the G25 shifter was fabricated using the same method as explained in the last step, made just a little bit harder as it was too short to get a set-square in place while we were welding. The spirit-level was used again to get the correct angle, and the bracket welded into place. A 3mm thick steel plate, 100 x 170mm, was cut to the shape of the bottom of the shifter assembly, the edges chamfered and then welded into place at the top of the bracket. A mop wheel was used to clean the welds up as much as possible, and then an 80-grit sanding disk rounded off all of the sharp edges. The inside area of the bracket will be sanded down with emery paper before being painted.

In every project there is usually a task that you really dread, and this was the one we had been avoiding. Why would something like a seat support cause such angst? Firstly, the seat is so full of lumps and bulges that there are about nine different angles involved. The other issue was working out the best materials to use, stuff that would have the strength to perform without being too bulky – remember, the complete seat assembly has to be adjustable.

Starting with some 10mm solid steel rod, the basic frame was bent up using a bench vice and a length of hollow steel tubing. The steel rod was secured in the vice, with the point of the bend level with the edge of the jaws and then the hollow tube slipped over the top, to provide leverage and concentrate the force onto the right spot. The frame was then MIG welded onto the underside of the 3mm thick seat-base.

The actual support bracket was fabricated out of 3mm thick plate, 275 x 65mm in dimensions. The ends were bent forward on a 35° angle, so that they would line up with the sides of the seat, and 8mm holes drilled and countersunk. Again, the MIG welder was used, and in this picture the results have been left raw so that you will be able to see just how much effect the mop wheel and sanding disks actually make.

At the end of Part 01, there is a lot less exercise bike than there was at the beginning, and hopefully you can see a lot more car simulator!



▲ **Finally, the simulator actually begins to take recognisable shape.**

At the beginning of this tutorial we mentioned that we wanted to create an 'enviro-simulator that reproduces the true ergonomics of a full size cockpit', and that is the path that we're still on. To get the ergonomics as accurate as possible we actually went out and measured the pedal/wheel/seat measurements of a race Super-kart, a West open wheeler and a Porsche 911 GT3 – and then made a few adjustments to make our simulator a little more compact.

With the pedals and gear change positioning set, the next step, in Part 02, will be to fabricate the mounts for the correct location for the steering wheel. Obviously there is still a lot more work to be done, including paint and the other add-ins such as the Butt kicker and 5.1 sound, and some pseudo-bodywork just for the aesthetics of it all. ☺

IF A FRIEND TELLS YOU LIFE SUCKS  
TELL THEM WHERE TO GO





## Obscure fields

Christ Taylor looks into some of the more left field degrees and careers.

Thus far, atomic.edu has focused only on fields of information technology that are, well, *mainstream*. We've done this because, realistically, most of you who are reading these articles on a regular basis will be looking at getting into programming or games development or network administration. Chances are, you'll be tackling one of the four following bachelor degrees or some variation thereof – Information Technology, Computer Science, Information Systems or Multimedia. However, this month we've decided to cater to those of you who aspire to do something that's a bit more obscure than animation or security.

### Advantages and disadvantages

There are many reasons for looking at some of the more unusual areas of information technology when it comes to doing a course and/or seeking employment. For one, the fact you'll emerge from your studies a specialist means you're likely – although by no means guaranteed – to rake in some serious cash almost immediately. And, too, beyond the economic reward, you might find

that doing something a bit different is incredibly satisfying. You'll know that you're one of a very small group of people that can do what you do. That's not to say there are no downsides, though.

Firstly and, perhaps, most obviously, you

the near future, for the simple reason that so very few enrol in it.

On the other hand, you have Jake Carroll, enterprise storage specialist. He says, "There is a lot of progress in the market. And we need more

**“...if you do a highly specialised degree, your employment prospects are going to be limited.”**

should be aware that if you do a highly specialised degree, your employment prospects are going to be severely limited. There's a reason we keep describing these fields as obscure. Atomican Ben Cummings studied photonics. And yes, we know that's hardly straight info tech. "Australian employment prospects are not the greatest," he says. His university actually ran a dedicated photonics course, but he feels there's a high chance that his university will pull the plug on it in

useful people. The pay can be good to insane. Consider the fact that we've got such a need for storage in this era, a need for storage far beyond that of the home environment, and you start to understand just how much we need big storage specialists."

Another of our readers is currently studying infomechatronics, which he describes as a blend of mechanical, electrical and software engineering. Think robotics, kids. He's studying it because he



feels this is a field that's going to grow larger and become more important. He's right – his skills will be highly sought after – but if by some chance it takes a good few years for the Australian robotics industry to go anywhere, he could find himself possibly having to move overseas.

probably want you to have done whatever your state's highest-level year 12 maths unit is and a science. Physics would be best. Psychology, too, if you're actually looking at cognitive science.

Secondly, intake is probably going to be low. The university might welcome hundreds of

on-campus, which we're sure would have been somewhat appealing were the campus not located in the arse-end of nowhere.

Unless you're already used to travelling many hours for work or school, don't write off travel time as being irrelevant when it comes to choosing a course or place of study. Spending hours on public transport will tire you out. Having to wake up stupidly early and spend an hour and a half or more on the train to get to a rural campus just so you can attend that early morning lecture will be a pain once the excitement of no longer being in school wears off. And, more importantly, it's simply not ideal to be spending that much time on the road when you need to be studying at home or working.

## Of course ...

The good news is that you don't necessarily have to do a specialised course. As noted earlier, Jake didn't. To be sure, he majored in a fairly unusual field – a different one to the unusual field he ended up working in – but at the end of the day he was still a computer science student. So, as we've said numerous times in this series of articles, there's nothing wrong with a good old-fashioned Bachelor of Computer Science. So long as you choose your electives smartly – be sure to work in a few units that show you're capable of communicating with your fellow human beings as well as computers – the Bachelor of Computer Science is a nice and versatile degree that can take you to some

**“...there's nothing wrong with a good old-fashioned Bachelor of Computing Science. ”**

## Specialised courses

Quite often, courses don't exist for the more obscure fields out there. Inforomechatronics is but one major study that's available in the engineering departments of some universities. As for enterprise storage? Jake studied nothing of the sort. "I have an Honours Degree in Computer Science. My specialisation is Cognitive Human Computer Interaction (HCI)."

Occasionally, though, you'll be flicking through your state's university course guide and happen across a highly specialised degree such as photonics or cognitive science. If one of these catches your eye, keep the following in mind. Firstly, the entry requirements are likely to be quite high. Beyond the obvious – good marks – they'll

information technology students each year, but they might only bring in a handful to their cognitive science programme. Of course, that's assuming there's any new intake at all. Monash University used to do a cognitive science degree, but the plug was pulled due to lack of numbers. The only students there now are those who are finishing up their degrees. Once they're done, the degree will unfortunately be gone.

Even when the Bachelor of Cognitive Science was taking in new students, it was only run at the Gippsland campus. Students were made to choose between driving a great distance – unless they happened to live in the area, that is – or spending a hell of a lot of time on the V-Line service which, as you can imagine, didn't run all that frequently. They also had the option of living

interesting places but, at the same time, see you into a more mainstream job if need be. Jake has this advice in regards to choosing a course and getting a job in some of information technology's more specialist fields – especially his own, enterprise storage.

"Well, in many instances, you will probably need a degree in information technology or computer science to get near the 'big' stuff. The reason I say this is that there is a lot of background you need in many wide-ranging concepts within lower-level computing to really understand the bigger picture. Sure, you can pick it up from experience or on the ground, but it would be a serious slog.

"Find yourself an entry-level job as an enterprise administrator. Once you've established yourself a little bit and you understand high-end UNIX systems at a very low level (i.e. Solaris, HP-UX, AIX), you can probably venture towards the storage side of things. It is a [step-by-step] process. It isn't easy to go 'I want to be in big storage.' You need to understand all the bits that click it together first."

Consider studying some maths, too. Jake advises those who want to get into storage – although we'd say this advice is equally valid for anyone looking at doing something flash – to study some pure maths.

"People often ask, 'Why do you need mathematics?' And we tell them [it's] because you need to understand mathematical models at times to manage data flows, data migration policies and



HSM archiver functionality. The thing is, when you are on the job, your maths comes together in a whole different way. You learn and it all makes sense."

Furthermore, Computer Science schools tend to offer their students a huge range of electives. You should be able to at least minor, if not major, in something that's at least quasi-relevant to what you're looking at getting into. Combine that with some maths and communications-type units – i.e. technical writing, project management, journalism – and you should be fine. Of course, Computer

Science isn't the best option for everyone. A Bachelor of Engineering, majoring in software engineering, may, depending on your desired field of employment, be more relevant. Many of these specialised fields aren't so much straight info tech as they are red-headed, bastard children of information technology and one or more forms of engineering, a science or even an art. Again, keep in mind that studying units heavy on logic will only get you so far. You need some writing units tucked in there to demonstrate that you're a well-rounded individual. 

## Mid-year entry into multimedia

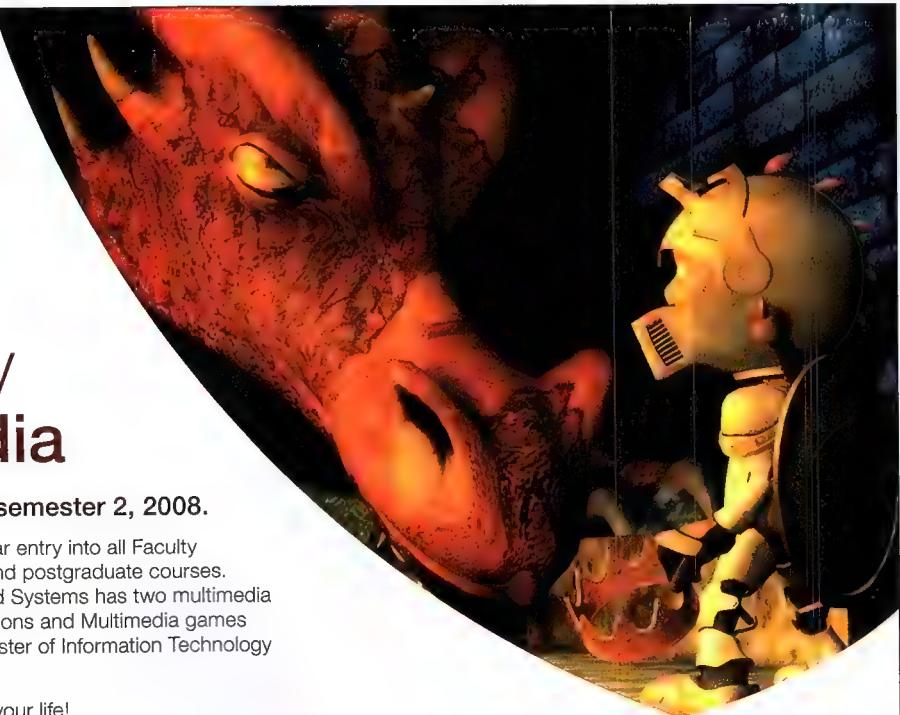
**Start your multimedia studies in semester 2, 2008.**

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## I/O

**Daniel Rutter's** getting himself all hot under the collar dealing with reader problems.



## I/O OF THE MONTH

## How low can you go?

**I** Lots of people bandy around 32nm as the lower size limit of standard silicon transistors (or even SOI transistors), which is a wall that's going to be hit soon seeing as Intel already has CPUs out at 45nm.

Is this really true, and why? Or is it just a case of current perceived wisdom that will, as have many others, be disproved by advances in technology?

And how does a 32nm transistor compare to the universal SI unit of small things, the width of a human hair? Or even the length of a football field?

Matt Crook

**O** A human hair's about 60 to 80 microns in diameter; a micron is a thousandth of a millimetre. A nanometre is a thousandth of a micron, though, so a 70-micron hair is 2187.5 times as wide as a 32-nanometre object.

The pylon-to-pylon span of the Sydney Harbour Bridge is 503 metres. If you scaled up so the hair was 503 metres wide, the 32-nanometre object would now be about a hand-span across.

I keep saying 'object' rather than 'transistor' because there are weasel words involved when semiconductor companies talk about transistor size. Nanometre numbers are always actually telling you the 'feature size' of a given manufacturing process – basically, the smallest thing it can make on the chip. The smallest feature may or may not – and usually won't – constitute a whole transistor by itself.

There's not actually any standardised way to measure the size of the transistors on a chip, so you should take all such numbers with a grain of salt.

That said, there certainly are limits to the feature size you can create with photolithography, the current chip-fabrication technology.

When you're using basic photolithography – light shining through a stencil mask to print a pattern onto photoresist – the finest detail you can print is dependant on the frequency of the light; the higher the frequency, the finer the detail. This is why the

light used for chip photolithography started out in the near ultraviolet, and has moved to deep ultraviolet.

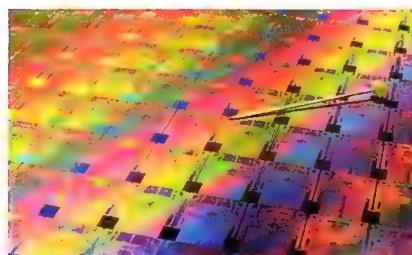
At the end of the ultraviolet spectrum, though, air blocks the light, so you have to start doing fabrication in a vacuum (which is still experimental). Go even further than that and your 'light' becomes X-rays, which can also be used, but aren't commercially viable yet either.

Mainstream chip fabs have, therefore, been stuck somewhere short of the end of the ultraviolet for a long time. They've been using other tricks to keep pushing feature sizes beyond – FAR beyond – what previously appeared to be physically possible.

'Immersion lithography', for instance, is the hot new thing for current chips. It means doing your lithography *underwater*, to improve the resolving power of the lenses.

After a while, though, you run into serious information-theory limits, and you really and truly cannot go any further with a given technology no matter what you do. That's what happened with 56K modems, and it's going to happen, probably pretty soon, with photolithography too. There's no point worrying about what the actual limit number is, though, given that there's no standardised way to measure manufacturing process feature size anyway.

There's no laws-of-physics reason why feature sizes shouldn't shrink right down to *atomic* dimensions – a silicon atom is less than a third of a nanometre in diameter. To do that, though, photolithography is going to have to go away, and we're going to have to switch to a finer-grained form of 'nanolithography'.



▲ These are 45nm Core 2 Duos, each with 410 million transistors.

## I/O OTM wins a Logitech G5!

There's a mouse in the house. Okay, it's not in the house, it's in IO. And it looks damn good.



## These Colecos'll burn up on you like THAT!

**I** I have a friend who recently bought a new Media Centre PC. The usual stuff – dual core Intel processor, nice hi-fi-styled case, reliable PSU, low-end ATI video card, two hard drives striped for speed, and a dual TV tuner card. It works splendidly and looks good on his LCD telly.

One problem – he's paranoid that if he leaves it on overnight, it will catch fire.

I would have thought this was, well, unlikely. Even if a CPU overheated or something, I would have thought it would immediately short circuit and thus stop generating heat.

So, is he being overly paranoid, or am I being overly cavalier?

Tom

**O** Computers are pretty low on the fire-risk scale. A PC certainly will hang hard long before any processing parts of it get to ignition temperature, but the PSU will probably keep running, and even a small PSU delivers more than enough power to kick a flame out of a short circuit.

There's not much flammable material *inside* a PC, though, so all you get even in the most impressive failure situations – +12V line sheared off when you slammed the case closed, expansion card jammed into the slot wrong – is a *brief* flame from the problem point, followed by a bad smell and profanity.

I mean, think about it – what would happen if you put a couple of handfuls of dry leaves inside a PC, lit 'em, and closed the case? They'd burn out, the PC would be a mess, and that'd be about it. You might manage to get some embers coming out of the exhaust fans if the PSU was running at the time, and those could perhaps light the curtains or something, but this is what it'd take to get that to happen.

A defective PC can also serve as an ignition source if you've got flammable vapour floating around the place. But your fridge clicking on, or a wall switch, is much more likely to do that.

There's practically no electrical device, down to battery powered transistor radios, that can't in theory start a fire. But any normal house contains numerous and more likely candidates than a PC.

## Contents: 800 5.56mm gigabytes

**I** Having recently modded up my 'officy PC that got off the back of a truck' (okay, so I put some lights in it and some shiny dials on the front), I seem to have run out of room for hard drives, due to a fat fan for the front intake vent. It's cooling my PC nicely with a little wind tunnel type effect, however it does mean I can only fit ONE hard drive in my case...

Now far from doing the sensible and cheap thing (I am in my late teens after all) which would be to buy a thinner fan, I've got the idea into my head to construct my own external hard drive enclosure... out of an ex-military ammunition box!

Think of the wonders, opening the catches and swinging out the lid to reveal blinking lights and enough storage space for all my wildest needs! The only problem being I have NO idea what kind of devices I would need to support multiple hard drives, let alone hook 'em up to my PC.

Simplified, my plan is as follows:

1. Get hard drives, hard drive rack, ammo box.
2. Install rack into ammo box.
3. Install hard drives into rack.
4. ????
5. Awesome looking external HD enclosure!

Any advice towards improving this plan would go a long way in my Conquest of The Earth, and should you assist me I will ensure you hold a high rank among the survivors when they are toiling in my vast plutonium mines.

'Plasma' David

**O** I don't think you'd need to buy a whole rack device to get the drives in there – though if you want this to be a USB box, that could give you a quick one-step solution. Failing that, you could try USB-to-PATA/SATA adapters and a hub, all bodge into the box somehow.

Ammunition boxes, of course, come in a large variety of sizes, but I'm presuming you're not considering starting with one that originally held 72 RPG-7 grenades.

I've got exactly one ammunition box here (I keep a few small but very flammable items in it). Mine originally held 300 linked 7.62mm NATO cartridges, but I think there are boxes of very similar size and design that held 100 .50 BMG rounds or 800 5.56 NATOs.

This size of box is usually pretty easy to find at surplus stores, and its dimensions would be just fine for quite a large drive array.

The internal dimensions of this box are about 142mm wide by 280mm

long by 180mm deep, so you could get about nine 3.5 inch drives in there, standing on their noses or tails like dominoes. There'd be clearance for at least SATA and probably even PATA cabling, and a tolerable amount of air space between the drives. Eight drives could be quite well ventilated.

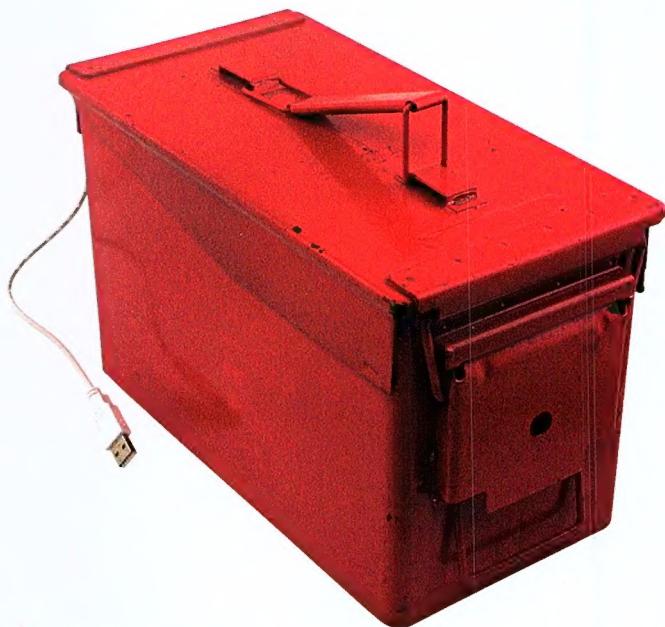
The box's super-tough latch mechanism wouldn't be good for drives, though. You can't even open a box of this type without jarring its contents, and the latch goes BANG when you close it, which is obviously bad.

A bit of brute force and ignorance could be employed to bend out the tight-fitting side flaps on the lid a little and similarly loosen up the catch, though. Budget for two boxes – ones like this seem to only cost about \$10 each even if they're completely rust-free; grotty-looking ones can be much cheaper – and it won't matter if you wreck one.

The box is made from 1mm mild steel plate, which is easy to work on, and it's wide enough that the clearance on each side of each drive for mounting hardware would be about 20mm. That's plenty of room to do something with hex standoffs, long screws, or what-have-you.

One simple mounting option would be to use the 3.5-inch cages from old and busted PC cases, which can be had for free (along with various other enormously useful things like keyboards that've been rained on and 3.5-inch floppy drives full of dog hair) at council cleanup time.

The width of the box is also pretty close to that of a 5.25-inch bay, so you could also try the cheap adapter brackets, available from any decent computer shop, that let you install 3.5-inch drives in those bays.



▲ And off to the airport we go!

# create your own game and win

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NEXT MONTH



### CABLE CLUTTER

We look at the wide and wonderful world of AV cable technology, from the history the humble connection itself to busting a few myths about modern high-end connectivity solutions.

### PROTOTYPE

Logan Booker has a look at the formative stages of this anticipated shape-changing actioner.

### RACING MADNESS

Ron Prouse continues down his insane angle-grinding path as we get one step closer to finishing his racing car simulator. Vroom!

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